Defining an Operational Carbon Neutral Goal for King County

Zoey Burrows, Lyndsay Gordon, Nicholas Schippers

A capstone project submitted in partial fulfillment of the requirements for the degree of
Master of Public Administration

University of Washington, Daniel J. Evans School of Public Policy and Governance

June 1, 2018

W EVANS SCHOOL
OF PUBLIC POLICY & GOVERNANCE
UNIVERSITY *of* WASHINGTON

Table of Contents

Executive Summary

In recent decades there is scientific consensus that climate change is real and that urgent action is needed to lower atmospheric greenhouse gas (GHG) levels. Governments from cities to nations are taking actions to mitigate carbon emissions and enact ambitious emission reduction goals. King County (the County) has long been a leader in addressing climate change and is committed to advancing the priorities outlined in its 2015 Strategic Climate Action Plan (SCAP). This report explores the question, "How should King County define a carbon neutral goal for its *operations*, based on its priorities and what carbon mitigation policy options should the County evaluate for its 2019 Implementation Plan for a Carbon Neutral King County Government"?

In February 2019 the County Executive will present to the County Council an implementation plan for King County operational carbon neutrality. The implementation plan will also inform the 2020 SCAP update. The County seeks to create a transparent framework or goal for reducing carbon emissions more quickly, in order to decouple County population and service growth from rising carbon emissions.

Based on our analysis we recommend establishing an ambitious near-term carbon reduction goal focused on emissions from scopes 1 and 2 and a long-term absolute carbon neutral goal that strategically incorporates scope 3 emissions (see Table 1 on page 9 for all recommendations and their rationale). Successful achievement of these goals will depend on a number of conditions being met in the years ahead, including buy-in at all levels of County government, the County's aggressive pursuit of near-term goals, and possessing the financial capacity and ability to adopt new technologies at the rate required to enact transformative infrastructure and behavior changes.

Why carbon neutral? There is consensus in recent years that global carbon reductions of at least 80% by 2050 are necessary to stay below 2 degrees Celsius of global warming. Scientific research highlights that there is still a window of opportunity to dramatically reduce emissions and avoid the worst effects of climate change that would come with more warming. What this tells us is more ambitious carbon mitigation goals are required. King County, as a recognized leader in climate action, has the opportunity to strengthen its commitment to climate action and spur community-scale action by setting more ambitious operational reduction goals.

The 2015 **Strategic Climate Action Plan's operational goals** are to reduce County emissions 25% by 2020 and 50% by 2030 compared to 2007 levels. However, total emissions from County energy and fuel use (operational only) decreased by 1% through 2015, falling short of its 15% reduction goal. Actions taken since 2015 -- the County's agreement with Puget Sound Energy to purchase renewable energy starting in 2019, achievement of carbon neutral operations in the County's Department of Natural Resources and Parks (DNRP), and King County Metro Transit's commitment to transition to a zero-emission fleet powered by renewable energy -- will all significantly advance the County's reduction goals. Nevertheless, the path to achieving new more ambitious goals will not be easy, and significant action is necessary to meet the County's existing reduction targets for 2020 and beyond.

Our analysis hinges on information from a **literature review as well as from over two dozen interviews** with the County's climate team and external climate mitigation leaders from universities, private sector, government agencies, and research institutions. These revealed that there are diverse carbon reduction efforts underway and despite strong commitments, barriers remain to achieving targets on-time (see comparison table of organizations and their carbon mitigation goals on page 10). Several overarching takeaways include:

- Ambitious goals can provide an important framework for decision making.
- Many organizations have adopted long-term carbon neutral goals for 2050, such as the City of Austin, the City of Copenhagen, University of California, among many others.
- Carbon pricing strategies have received recent attention at universities, companies, and governments to drive emission reductions and fund direct carbon reduction strategies.
- Energy efficiency activities are often prioritized but can quickly plateau when the more cost-effective projects have already been addressed.
- 100% renewable energy goals are becoming more common at for-profit companies and cities, often after first achieving their carbon net neutrality goals.
- A mix of near and long-term goals that build on each other is a common practice.

Based on input from King County staff and a review of County strategic plans, we developed **four primary criteria** to evaluate policy components against: climate benefits, feasibility, alignment with King County priorities (which includes equity and social justice), and community and partner engagement. Using these criteria, we explored and **assessed five key questions** that must be asked in setting a carbon neutral goal. Answering each of these questions will help the County make an informed decision in setting a more ambitious carbon mitigation goal.

1. How should a carbon neutral goal be defined?
2. Where should the boundaries be drawn?
3. How to set a timeline for a carbon neutral goal?
4. What direct emission reduction strategies should be prioritized?
5. What indirect emission reductions should be included?

Question 1: How should a carbon neutral goal be defined?
There is no universally accepted definition of carbon neutrality. Strategies to achieve a carbon neutral goal vary depending on how the goal is defined, particularly the use of direct and indirect emissions reductions. We considered the following goal types: carbon net neutral, absolute carbon neutral, fossil fuel free, zero-emissions (related to transit or fleets), 100% renewable electricity, and carbon negative.

The primary tradeoff exists between carbon net neutral and absolute carbon neutrality. A carbon net neutral goal includes the use of external offsets to reach the goal, whereas all emissions reductions must be done within boundary for an absolute carbon neutral goal. Absolute carbon neutrality can be difficult to achieve and the level of ambition depends heavily on how the boundary is set and whether the entity has emission removals, such as carbon sequestration, within its boundary. Carbon net neutral, in contrast, often relies heavily on

investments in emission reductions outside of the organization's boundary. This is feasible if there is sufficient funding, but likely has fewer climate reduction benefits and requires significant due diligence and oversight. Furthermore, purchase of external emissions reductions reduces the availability of funds for direct emission reductions that can lead to long-term transformation. The other goal types set targets for specific segments of operations. A 100% renewable, zero-emission, and fossil fuel free goal focus on emissions from electricity, fleets, and fuels respectively. While more narrowly defined, these goals can serve as interim targets on a path to carbon neutrality. Notably, a fossil fuel free goal focuses on direct reduction of all fossil fuels, ensuring that the associated reduction in air pollution from fossil fuel emissions provides public health and potential equity and social justice benefits to local residents.

We recommend adopting an ambitious near-term reduction goal (such as 80% by 2035), to build on the current SCAP goal of 50% emission reductions by 2030. In the long-term we suggest adopting an absolute carbon neutral goal to begin in 2050. This recommendation would provide substantive climate benefits, a good leadership opportunity, and can support community emissions targets. This is an ambitious goal but can serve as a model to nearby cities, counties, and the community at large. The feasibility of these goals and especially the target years should be further evaluated with quantitative analysis.
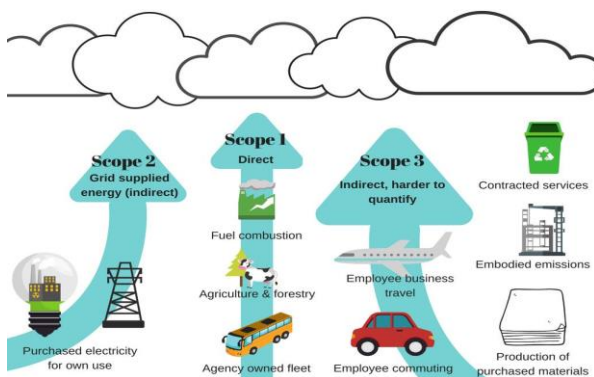
Figure 1: *Overview of scopes and emissions across activities.*

Question 2: Where should the emissions boundaries be drawn?
A boundary refers to how decisions are made regarding which emissions are included and excluded within a GHG inventory. How the boundary is defined has significant implications on the level of ambition of a goal. A GHG inventory is a full accounting of atmospheric emission sources and removals from sectors such as waste, electricity, product use, agriculture, land use, and industrial sectors. In the public sector there are two types of emission boundaries, operational and communitywide. An operational goal includes emissions from sources that the organization owns and operates, whereas community emissions are those released in the organization's geographic boundary.

The GHG Protocol for Public Sectors recommends that inventories be complete with all emission sources and activities, enable tracking of reduction progress over time, provide a transparent and clear methodology that is easily verified externally, and result in an accurate inventory. Within an inventory, organizations must choose what types of emissions to include, which fall into three scopes as outlined in Figure 1.

In particular scope 3 emission sources and removals are difficult to quantify and reduce due to limited direct control and scarce or unreliable data. However, scope 3 represents the majority of emissions for many organizations, so they are critical to address for transformative change. Many organizations strategically include scope 3 emission sources to achieve various priorities.

Including scope 3 reductions, such as Metro ridership, should be avoided unless it creates organizational change and additional means for emission reduction. Potential benefits of addressing specific scope 3 emissions include:

- Engaging King County employees in emission reduction efforts (e.g. business travel)
- Progressing toward community emissions reduction goals (e.g. contracting emissions)
- Enhancing equity and social justice and fostering local economic development

In the near-term we recommend including scopes 1 and 2 exclusively within the *goal* boundary while continuing to holistically *inventory* scope 3 emissions. The purpose of this expansive inventory is to gather information to incorporate strategic scope 3 emissions in the goal boundary in the future. The boundaries would expand over time to include actionable scope 3 emissions as more accurate data becomes available. Further analysis should be conducted to identify what scope 3 emissions will best advance County priorities.

Question 3: How to set a timeline for a carbon neutral goal?
There are three timeline elements that must be considered: baseline year, duration, and target year. A baseline year is the inventory year that provides a comparison for tracking GHG reductions. King County uses 2007, its first accurate GHG inventory as its baseline. For consistency and accuracy we recommend continuing to use this baseline. A target year is when an organization is committed to achieving its goal and if offsets are included, when the offset commitment begins. Near-term target years provide accountability and engagement while long-term targets allow more time for planning, implementation, and technology development. In order to harness the benefits of both options, we recommend a near-term target year of 2035 and a long-term target year of 2050.

The near-term target year emphasizes feasibility and public accountability and was chosen primarily based on the feasibility study for a zero-emission fleet, which suggests the earliest year for full adoption is 2034. We recommend that further quantitative analysis be performed to ensure that a 2035 target year is appropriate in the near-term for all emissions. The long-term goal provides a flexible framework for scaling ambition, incorporating new technologies, and is consistent with other public-sector leaders, including the Carbon Neutral Cities Alliance.

Question 4: What direct emission reduction strategies should be prioritized?
Direct emission reductions can take many forms but those considered in this report are energy efficiency measures, renewable energy, an internal carbon fee, an analysis tool such as a shadow price of carbon, and an electric fleet. All of these strategies and more will likely be required to reduce the County's carbon emissions at the scale needed. How and when these strategies are implemented must be studied further through quantitative evaluation. A key tradeoff for direct reductions is between cost and transformative change, or amount of emissions reduced. Activities that we recommend prioritizing and studying further include:

- An internal carbon fee and shadow price to make direct reductions more feasible and cost effective by reallocating resources, or shifting the abatement cost curve.

- More ambitious energy efficiency activities are cost effective, feasible, and within the County's control. They also provide opportunities for emission reductions if pursued more aggressively in 2020 and beyond.
- A zero-emissions transit fleet provides transformative change with major climate benefits, likely equity and social justice impacts, and engages the greater community.
- Renewable energy is feasible, has climate benefits, and is perceived well by the public.

Question 5: What indirect emission reductions should be included?
There are three primary types of indirect reductions. Offsets are most common and are generated by project-based activities aimed to reduce GHG emissions, for which the credit can be transferred by purchase between organizations. Renewable energy credits (RECs) are a market-based instrument that provide the rights to the environmental, social, and other non-power attributes of renewable electricity generation. Finally, sellable renewable identification numbers (RIN) account for biofuel use in transportation, incentivize alternative fuels in the marketplace, and track their volume. One of the primary tradeoffs is that while feasible to purchase, indirect reductions are not transformational. Because they do not reduce emissions within boundary, they must be purchased year over year until they are replaced with direct reductions. Unless offsets are restricted to locally based projects they are unlikely to contribute benefits like new jobs, local equity, or better service delivery within the County. We recommend excluding them in the near and long-term.

Our recommendations along with supporting rationale and examples of organizations' approaches to the five key questions are summarized in **Table 1** on the following page. Based on this assessment, some elements of the recommendation are more clearly substantiated while others require further research and quantitative analysis.

Recap of Recommendations:

- **Goal Type:** Near-term GHG reduction goal, long-term absolute carbon neutral goal
- **Boundary**: Near-term scopes 1 and 2; over long-term incorporate scope 3 strategically
- **Emissions Reductions:** Prioritize investment in direct emissions reduction; exclude indirect reductions (e.g. offsets, RECs)

Elements of this recommendation that require further quantitative research for feasibility, implementation, and ability to support other King County priorities, such as equity and social justice, include:

- **Target Year:** Proposed as 2035 near-term; 2050 long-term.
- **Emissions Reductions:** How to implement energy efficiency, zero-emission fleet, 100% renewable, shadow cost of carbon and/or fee. Emission reduction strategies in particular must be further analyzed for feasibility, implementation, and their capacity for emission reductions.
- **Scope 3:** Which emissions best support King County priorities and should be included.

Table 1: Recommendation for King County Carbon Neutral Goal: There are 5 key questions for King County to consider in defining a carbon neutral goal. Recommendation and rationale for near- and long-term goal was based on: 1) Assessment against four criteria objectives: climate benefits, feasibility, alignment with King County priorities, and community and partner engagement; and 2) lessons learned from in depth case studies and over two dozen interviews conducted in with climate experts, and staff from government, university and private sector organizations.

	Recommendation	Rationale	Example
Question 1 How should a carbon neutral goal be defined?	**Near-term:** Ambitious GHG reduction, such as 80% **Long-term:** Absolute Carbon Neutrality	1. Near-term goal builds on current SCAP goals, increasing its reduction ambitions. Selected as it is **feasible** and promotes **accountability.** 2. Long-term goal is based on what science calls for in terms of **climate benefits** and can support **community emission targets.** But the specific goal type selected must be studied further.	**City of Fort Collins**, Colorado has made significant reductions leading up to its 20% by 2020 and 80% by 2030 reduction targets. As of 2017, the city achieved a 17% reduction in emissions from 2005. It also has a long-term 2050 carbon neutral goal that was set in 2014.
Question 2 Where should the boundaries be drawn?	**Near-term:** Scopes 1 and 2; inventory scope 3 **Long-term:** Scopes 1 and 2; strategic Scope 3 inclusion	• Scopes 1 and 2 selected for accurate data, direct **control**, and **accountability.** • Scope 3 emissions are difficult to quantify and control and must be studied further. Long-term Scope 3 reductions support **community emission targets** and employee **engagement.**	**Harvard and Yale University**: Inclusion of scopes 1 and 2 only in goal; tracking Scope 3 in inventory. **Metro Vancouver**: Includes contracting emissions in Scope 3 as new contracts are signed to require contractors to inventory and reduce their own Scope 1 and 2 emissions.
Question 3 How to set a timeline for a carbon neutral goal?	**Near-term:** 2035 target year; 2007 Baseline **Long-term:** 2050 target year; Annual Duration	• Near-term provides **accountability** and driv**e** but allows time for **implementation.** • Long-term provides an **engaging** framework and **feasibility** to expand the boundary.	The **Carbon Neutral Cities Alliance (CNCA)** is a collaboration of leading cities committed to aggressive reductions by a 2050 target year to provide a unified voice for policy change driving deep reductions and transformative change.
Question 4 **What direct emission reduction strategies should be prioritized?**	• **Energy efficiency** • **Electric transit fleet** • **Renewable electricity** • **Internal Carbon Fee** • **Social Cost of Carbon**	• A zero-emission fleet, 100% renewable electricity, and energy efficiency being implemented and may be achieved by 2035. • A carbon fee makes direct emission reductions more cost-effective, create funds to reinvest, and further engages employees in mitigation. • A shadow price of carbon engages decision makers by monetizing climate benefits, like emission reductions, during financial analysis of large projects.	**Metro Vancouver:** A social cost of carbon is used for infrastructure projects to favor a 'cost reasonable' solution with high emission reductions over simply the lowest cost option. **Microsoft:** "What makes the carbon fee truly pivotal for our environmental work is the combination of the accountability driven by the price signal and the earmarking of the collected funds for environmental initiatives."
Question 5 **What indirect emission reductions should be considered?**	**Near-term: Exclude** **Long-term: Exclude**	• Potential public perception and financial stewardship concerns (i.e. use of tax dollars). • Little alignment with King County priorities, especially local equity and social justice.	**City of Austin,** Texas will buy several hundred thousand dollars of offsets to hit its 2020 carbon net neutral goal, but many organizations including British Columbia have been criticized for offset use.

Table 2: Organization Comparison Table of various entities and their established carbon neutral goals broken down by the five components of setting a goal: goal type, target year, boundaries, direct reduction strategies, and indirect reductions.

King County	GHG Reduction & Renewable Energy	County Operations: 25% reduction by 2020; 50% by 2030 (compared to 2007). Countywide: 25% reduction by 2020, 50% by 2030, 80% by 2050 (compared to 2007)	Operations and Communitywide	Operations: Scopes 1 & 2; Countywide: Geographic based methodology	2007	SCAP implementation	None
King County Department of Natural Resources and Parks	Absolute Carbon Neutral	Achieved in 2016; first inventory taken in 2000.	**Operations**	All three scopes "to the extent possible"	2007	- Tree planting - Loop biosolids - Energy efficiency - Renewable energy	None
King County Metro	Zero-emissions & GHG Reduction	2040, by 2034 at the earliest	**Operations**	Scopes 1 and 2	2016	- Electrify its fleet - buses and trolleys - Purchase renewable power source for this new electrical load	None
City of Seattle	Carbon Net Neutral & GHG Reduction	Carbon neutral by 2050 and interim goal to reduce core emissions 58% by 2030 (first inventory in 1990). 1. Road Transportation & Land use - 82% reduction by 2030 2. Building energy - 39% reduction by 2030 3. Waste - 70% Diversion Rate by 2022 & 50% methane reduction by 2020	Communitywide	- Scopes 1 and 2 - Focused on areas the City has the most influence, and then "supporting" or helping with freight, air, industry	2008 (year of peak emissions)	~90% direct reductions possible: - Road transportation & land use - Buildings: proposed 2015 Energy Code (commercial) would increase the efficiency of new construction and substantial alternations of existing buildings - Waste	Estimated will need to reduce 10% of emissions with offsets in 2050.
Seattle City Light	Carbon Net Neutral & Renewable Energy	Achieved in 2005	**Operations**	Scopes 1 and 2	2008	- Renewable energy e.g. hydro, wind - Energy efficiency and conservation	Purchases offsets annually.
Microsoft	Carbon Net Neutral	- Carbon neutrality achieved in 2013, through purchase of indirect offsets - New goal made in 2017 to reduce operational emissions 75% by 2030.	**Operations**	- Scopes 1 and 2 - Green-e certification or as close as possible	2012	- Internal price on carbon - Encourage culture of sustainability across all departments	Purchases offsets annually.
Google	Carbon Net Neutral & Renewable Energy	- Carbon neutrality achieved in 2007 - 100% renewable energy as of 2017 - Maintain carbon neutrality for internal operations	**Operations**	- Scopes 1 and 2 - Working to begin reducing scope 3 emissions.	2007	- Pursue aggressive energy efficiency initiatives - Purchase significant amounts of renewable energy	Purchases offsets annually.
British Columbia	Carbon Net Neutral	Carbon Neutral since 2011 with annual reporting and offsetting.	**Operations**	Scopes 1, Scope 2, and limited Scope 3 emissions (including paper & business travel).	2007	- Buildings - Fleet	Heavily dependent and must be purchased within BC borders.
Copenhagen	Carbon Net Neutral & Fossil Fuel Free	Carbon net neutral by 2025. Fossil-fuel free by 2050.	Communitywide	Scopes 1 and 2	1990	- By 2025 ~74% of reductions from energy production, power and heat - "Mobility" will account for 11% of 2025 reductions: more public transportation & biking infrastructure.	May need to purchase up to 50% of total reductions for 2025 goal.
Carbon Neutral Cities Alliance (CNCA)	GHG Reduction at Deep De-carbonization levels	Transformative change of infrastructure at the City level to enable emission reductions of at least 80% by 2050, based on per capita calculations.	Communitywide	Boundary-based emissions within the community, quantified via baselines or per capita emissions.	Varies by City	- Speaking with a common voice - Creation of Innovation Fund - Focus on de-carbonizing and transforming to new low carbon economy	None

Part 1: Introduction and Research Methodology

In recent decades there is scientific consensus that climate change is real and that urgent action is needed to lower atmospheric greenhouse gas (GHG) levels.[1] Governments from cities to nations, large multinational businesses, universities, and other organizations are taking actions to mitigate emissions and enact ambitious emission reduction goals. Both the developed and developing world is acting on climate change. The less developed world is poorly equipped financially and technically to mitigate and adapt to climate change, despite containing regions that will be most severely impacted by some of the effects including droughts, floods, and fires among others.[2]

There are key policies or mitigation actions that should be enacted at the national or at least the state level, such as electrifying production, carbon pricing, and fuel economy Corporate Average Fuel Economy (CAFE) standards. Much climate mitigation work takes place at the local level as well, and in the US, there is often more willingness to act at the local level. However, there are only so many emissions under direct control of local governments. In addition, a tradeoff exists between what local governments can measure versus what they can influence. This is important to consider when examining how King County (the County) should set an operational carbon neutral goal based on its priorities.

While many governments have set reduction goals, most of these targets are not ambitious enough to keep the planet from warming past 2, ideally below 1.5, degrees Celsius from preindustrial levels. This is the limit recommended by the world's leading climate scientists, which informed the 2015 Paris Agreement.[3] Accordingly, some governments are discussing how to better align their goals with what science says must be done now in order to avoid the worst impacts of climate change. Governments are seeking ways to be more ambitious in addressing climate mitigation, and this is why carbon neutrality is being considered.

Studies illustrate that taking action to address climate change can have many additional benefits. In 2013, the Carbon Disclosure Project along with the C40 Cities Climate Leadership Group, found that, of the 110 global cities reporting, 91% say that tackling climate change presents economic opportunities. Additionally, 62% of the reported reduction activities undertaken by cities demonstrate the potential to make cities more attractive to businesses.

---

[1] "The Paris Agreement | UNFCCC." Accessed May 27, 2018. https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement.
[2] Intergovernmental Panel on Climate Change, accessed May, 2018: www.ipcc.ch/ipccreports/tar/wg2/index.php?idp=674
[3] "The Paris Agreement | UNFCCC." Accessed May, 2018. https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement.

The largest business attractors are energy efficiency actions and development of infrastructure for non-motorized transport.[4]

1.1 Research Purpose

The 2016 *King County Comprehensive Plan (Comprehensive Plan)* includes a new policy, F-215b, directing the County "to strive to provide services and build and operate public buildings and infrastructure that are carbon neutral."[5] As part of the council-directed work plan in support of the *Comprehensive Plan* the Executive is committed to developing an *Implementation Plan for a Carbon Neutral King County Government (Implementation Plan)* due in February of 2019. This report is intended to inform the County's carbon neutral implementation plan and uses qualitative analysis of carbon mitigation best practices across organizations, specifically how they define carbon neutrality and pursue this goal. The County will follow up on this report with further quantitative assessment as part of its overall strategy to address climate change. The implementation plan will:

- Address the actions, costs, and schedule for achieving a carbon neutral goal.
- Integrate the 2015 SCAP, the County ordinance 17971, and Metro's "Feasibility of Achieving a Carbon Neutral or Zero-Emission Fleet" report.

1.2 Research Questions

"How should King County define a carbon neutral goal for its operations, based on its priorities and what carbon mitigation policy options should the County evaluate for its 2019 *Implementation Plan for a Carbon Neutral King County Government*?"
Supplemental questions include:

- How do comparable organizations define carbon neutrality and what are the ways that King County can define it?
- What are peer organizations' best practices for achieving carbon neutrality?
- What criteria should the goal components be assessed against?

---

[4] "Carbon Disclosure Project." Accessed May, 2018, https://www.cdp.net/en/reports/archive.
[5] "Adopted 2016 King County Comprehensive Plan - King County." Accessed June 1, 2018. https://kingcounty.gov/council/CompPlan/2016compplan/adopted.aspx.

1.3 Methodology

The methodology design consists of four parts, including a thorough literature review and study of organizations of interest to King County; interviews with individuals working in climate mitigation or carbon neutrality program implementation; the development of criteria for analysis; and the evaluation of multiple policy components. These methods inform the final recommendation.

A **literature review** was conducted on carbon neutrality best practices. This focused on relevant white papers, companies, governmental agencies, universities, local or regional coalitions, and the carbon neutral goals or strategies they have set or achieved so far. This helped inform the appropriate definition of "carbon neutral" for King County operations and to summarize the most successful approaches to addressing carbon neutrality at present. It also informed the development of a list of relevant evaluation criteria.

Second, over two dozen **semi-structured interviews** were conducted to understand how a carbon neutral goal might be approached in King County. Interviews also sought to understand how carbon neutral goals have been implemented and achieved in other organizations. Interviews explored circumstances across which a carbon neutral goal has had varying success, and ways in which carbon neutral is defined. This report relies heavily on these interviews, conducted from February through May of 2018. Interviewees included King County employees, peer organizations' climate mitigation staff, climate thought leaders, and employees in local governments, companies, utilities, and universities.

Third, **key evaluation criteria were developed** based on King County priorities and best practices determined during the literature review phase. Five to ten criteria were initially considered and then refined to four overarching key criteria that were identified as most relevant and important. Next, input from County employees ensured that these key criteria meet ongoing plan implementation needs.

In the **qualitative analysis phase,** tradeoffs related to each goal component were compared to the selected criteria. This analysis informs the final recommended carbon neutral goals that are best suited to mitigating County operational emissions. This integrates content from both the literature review and interviews conducted and will prepare the County for an upcoming quantitative analysis in the second half of 2018, before the County's Implementation Plan is due in early 2019.

1.4 Guide to This Report

First a brief overview is provided about King County, its climate action plan, and recent progress against that plan. This is followed by an explanation of the four key criteria to be used for later qualitative analysis. Next, there is an explanation of the five key policy questions or components that must be asked when setting a carbon neutral goal. This includes some organizational examples to help illustrate key concepts. To support this, we conduct a comparison and discussion of carbon neutral goals by governments, private companies, and universities. Finally, lessons learned are presented, gleaned from interviews and the literature review, and evaluated against the criteria, followed by the final recommendations based on these key findings.

Part 2: Background on King County

The 2015 estimate of King County's population was 2,052,800, making it the 13th most populous county in the nation and growing.[6] King County is already experiencing the impacts of climate change, including warming temperatures, acidifying marine waters, increasing flood risk, decreasing mountain snowpack, and less summer precipitation. The County is tracking human health and economic impact indicators that are showing increasing frequency of natural disasters, decreasing salmon populations, increasing incidence of forest fires, and more heat-related impacts to human health. The County has prioritized direct action and strategies that have relevant co-benefits. [7]

The County's Department of Natural Resources and Parks (DNRP) achieved carbon neutrality in 2016, serving as a pilot for County operations as a whole.[8] Its Wastewater Treatment Division and the Solid Waste Division each seek to achieve carbon neutral operations by 2025. In 2017, an in-depth King County Metro report recommended transitioning to a zero-emissions bus fleet by as early as 2034 as the best way to reduce transit emissions.[9] Metro has already begun transitioning to a zero-emission fleet, starting with a pilot of 3 battery-electric buses in service in 2015, followed by the adoption and testing of 8 and 10 more buses respectively in 2018. This analysis builds upon these prior and ongoing efforts taking place across County departments to directly reduce carbon emissions and transition to low-carbon pathways.

2.1 King County 2015 Strategic Climate Action Plan

In 2015 the County adopted its most recent Strategic Climate Action Plan (SCAP), with the next update scheduled for 2020.[10] The County's current goals are to reduce operational carbon emissions 25% by 2020 and 50% by 2030 compared to 2007 levels. Its communitywide goals are the same but go one step further to include an 80% reduction by 2050 (see

Table 3).

---

[6] "Statistical Profile on King County," accessed May 10, 2018, kingcounty.gov/~/media/depts/executive/performance-strategy-budget/regional-planning/Demographics/KC-profile2016.ashx?la=en.

[7] "Strategic Climate Action Plan (SCAP)." King County, November 2015 https://your.kingcounty.gov/dnrp/climate/documents/2015_King_County_SCAP-Full_Plan.pdf.

[8] Ibid

[9] "Feasibility of Achieving a Carbon-Neutral or Zero-Emission Fleet." King County Metro Transit, March 2017. https://kingcounty.gov/~/media/elected/executive/constantine/news/documents/Zero_Emission_Fleet.ashx?la=en.

[10] "Strategic Climate Action Plan (SCAP)." King County, November 2015 https://your.kingcounty.gov/dnrp/climate/documents/2015_King_County_SCAP-Full_Plan.pdf.

Table 3: *King County Carbon Reduction Goals, SCAP 2015*

Countywide Emissions	>	2007 baseline, reduce 25% by 2020, 50% by 2030, 80% by 2050
Operational Emissions	>	2007 baseline, reduce by 15% by 2015, 25% by 2020, 50% by 2030
DNRP Emissions	>	Carbon neutral in 2017
King County Metro	>	Zero-emissions bus fleet powered by renewable energy between 2034 and 2040

The 2015 SCAP outlines the results of a technical analysis that established specific, quantifiable pathways to achieving its targets. Actions to reduce GHG emissions and prepare for climate impacts are embedded and integrated into the operations, services, and capital plans of all County agencies. It identifies five overarching goal areas to help mitigate climate change, with specific activities to be completed by 2015 and others by 2030. Within each of its goal areas, actions are divided according to "community- wide" emissions (called county services) and "government operations" emissions, the latter of which is the focus of this report and is defined further in Part 4.2. The largest local sources of GHG emissions frame the SCAP's five GHG emissions reduction goal areas. Fossil fuels used for transportation and energy used to heat, cool, and power homes and buildings are the two major sources of County emissions**.** The SCAP's goal areas consist of:

Transportation & Land Use
- Personal Transportation (Countywide)
- Fossil Fuels Used in Vehicles (Operations)

Buildings and Facilities Energy - existing buildings
- Home Energy and Construction (Countywide)
- Fossil Fuels Used in Facilities and Infrastructure (Operations)

Green Building - new buildings
- Home Energy and Construction (Countywide)
- Fossil Fuels Used in Facilities and Infrastructure (Operations)

Consumption and Materials Management
- Goods and Services (Countywide)
- Purchasing, Methane from Landfills & Wastewater Facilities (Operations)

Forests & Agriculture
- Food (Countywide)
- Forest Carbon Storage (GHG offset) (Countywide & Operations)

Within these areas, specific actions cover diverse strategies including transit, energy efficiency, renewable energy, green building, recycling, and preparing for local climate impacts. The 2015 SCAP has 70 priority actions outlined for completion by 2020, and more actions to be taken by 2030 and 2040. The SCAP also has several ambitious new actions or goals that will help the region meet countywide GHG direct emissions reduction targets and adequately prepare for the impacts of climate change including to:

- Update and implement green development codes by late 2017 for unincorporated King County.
- Use 100% GHG-neutral electricity in government operations by 2025.
- Partner with utilities and others to phase out coal-fired electricity by 2025 and help develop increasing amounts of renewable energy resources.[11]

Community Engagement and Outreach
The County is developing partnerships to advance countywide climate solutions and to support regional innovation in clean technologies. Many of the innovations in building energy efficiency come from the private sector through alliances like the Seattle 2030 District. The County's business engagement over the years helped shape the goals and strategies in the 2015 SCAP. The King County-Cities Climate Collaboration (K4C) is one such collaboration, which consists of the County and over ten cities, representing more than 75% of the County's population. Working collaboratively at the elected official and employee levels, the K4C has established a shared regional vision for climate action. Many SCAP strategies and priority actions mirror the K4C commitments. SCAP priority outreach actions for 2020 include:

- Build cross sector alliances
- Strengthen internal agency collaboration on communications & engagement
- Integrate climate change into Equity and Social Justice Strategic Plan
- Establish partnerships between K4C and the private sector[12]

2.2 King County 2015 Strategic Climate Action Plan Performance

Operational emissions account for roughly 1% of the County's communitywide consumption-based emissions. Figure 2 is a breakdown of the County's operational emissions by type.[13] This breakdown includes government-purchased goods and services, which account for 46% of the inventoried emissions, though these are not included in goal and subsequent progress reports.

---

[11] Ibid.
[12] Ibid.
[13] Ibid, page 6.

The County provides a comprehensive progress report on the SCAP every two years; the next one will come out in June of 2018. Overall as of 2015, County operations reduced GHG from its buildings and facilities by 16.7%, but emissions associated with operational vehicles increased 6% from a 2007 baseline. Total emissions from County operations decreased by roughly 1% overall between 2007 and 2015, falling short of the 15% reduction target for 2015.[14] The County seeks to get back on track by 2020. This reduction encompasses scopes 1 and 2, not

County Operations, GHG Emissions (2014)

- Purchased Goods & Services - 270,000 (2009)
- Transportation Fuels, Lifecycle - 192,200
- Facility Energy - 70,100
- Methane - Cedar Hills & Closed Landfills - 50,000
- Methane, Wastewater Treatment - 5,600

Total Emissions: 587,900 metric tons CO_2e

Figure 2: Breakdown of County operational emission sources

scope 3 (described in section 4.2). Countywide, per capita GHG emissions have begun to decrease due to declines in per-person vehicle travel and energy use in buildings, but overall emissions continue to rise, driven primarily by population growth. Significant action is necessary to meet the County's reduction targets for 2020 and beyond, as recommended in the 2015 SCAP. Below are examples of County accomplishments as of its 2016 progress report:
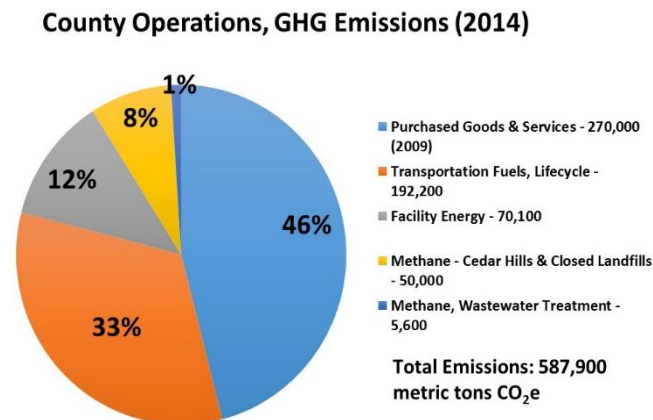
- **Transportation:** In 2015, energy use in Metro's fleets declined by approximately 2.6% from 2014, even as a record number of passengers rode Metro buses. By late 2015, 73% of Metro's bus fleet was hybrid or battery electric.
- **Energy Efficiency:** As of 2016, the County is on track to exceed its operational energy efficiency target and adopted a new working target that is 50% more aggressive.
- **Green Building:** Half of county-built projects achieved platinum building certification.[15]
- **Renewables:** The County is on track to exceed its near-term target to consume 70% of operational facility energy consumption with renewables by 2020.
- **Removals/carbon sinks:** The County and partners planted 117,925 trees and are ramping up a several large-scale planting projects towards its Million Trees goal.
- **Waste Diversion:** Recycling at its transfer stations increased by more than 40%.
- **Carbon Pricing:** In 2017 the County began considering a carbon fee and shadow price.[16]

The guidance from the County's SCAP underscores the priority given to direct emissions, over indirect reduction strategies. The development of the County's 2020 SCAP will update measures, targets, and specific priority actions for County climate mitigation, building on its existing commitments to mitigating climate change. An operational carbon neutral goal will be a part of the 2020 SCAP update, if adopted, and would build on the County's current commitments.

---

[14] King County SCAP: 2015 Annual Report." King County, June 2016. https://your.kingcounty.gov/dnrp/climate/documents/2015-annual-report-scap-06-2016.pdf.

[15] Measuring our Progress, Snapshot. King County, 2016. www.kingcounty.gov/services/environment/climate/strategies/progress-report.aspx

[16] "Progress Report: Implementation Plan for a Carbon Neutral King County Government." King County, Department of Natural Parks, Director's Office, December 2017.

Part 3: Evaluation Criteria

In order to make a recommendation for King County operations it was necessary to establish criteria for use in analysis. A master criteria list was generated pulling from a literature review, deep dives into several organizations, external interviews, and interviews with King County climate team members. This list was then refined to reflect primary King County priorities for climate mitigation. Four overarching criteria were established: climate benefits, feasibility, alignment with King County strategic priorities, and community and partner engagement. Each of these and their subcomponents are defined and explored below.

3.1 Climate Benefits

A primary objective of setting a carbon neutral goal is to provide a framework to create meaningful climate action. The framework should lead to both choices and projects that reduce King County's emissions and subsequently their operational contribution to anthropocentric climate change. Within the broader category of climate benefits four specific subcomponents were highlighted for consideration including emission reduction potential, level of transformative change, additional benefits, and employee engagement.

- **Potential for Emission Reductions:** While direct and quantifiable emission reductions are a clear objective of any climate goal, interviews revealed a tension between quantifiable reductions and projects that have high potential for a larger, but harder to quantify impact. As several interviewees mentioned it is important to "not confuse the things that you can count for the things that count."

- **Transformative Change:** Transformative change is a fundamental shift from business as usual that requires an investment in low carbon infrastructure to support a new economy not reliant on fossil fuels. For example, powering an electrified metro fleet by renewable energy is an example of transformative change that removes the reliance upon combustion engines. Switching to biofuels, by comparison, may reduce emissions, but is incremental. Addressing the level of emissions reductions required to avoid the worst of climate change requires redesigning carbon intensive infrastructure and systems such as electricity, transportation, and waste to low or zero carbon alternatives.

- **Employee Engagement:** A key component of successful strategies for an effective climate goal like carbon neutrality is the ability of the goal to engage and inspire employees. In British Columbia, Canada (BC) a key success factor for achieving emission reductions was the creation of a culture focused on sustainability that also encourages

innovative climate action.[17] Employees at King County echoed this sentiment expressing the desire for an operational goal that would provide the basis for shifting organizational culture and department-based practices in order to help reach emissions targets.

3.2 Feasibility

It is important that climate goals balance ambition with current limitations to ensure that they are achievable. For the purpose of this analysis, the subcomponents of feasibility are level of control, cost effectiveness, ease of implementation, flexibility, and departmental burden.

- **Level of Control:** The Carbon Neutral Cities Alliance (CNCA) defines the power to act for governmental entities as originating in four areas: owned and operated facilities, the ability to set and enforce policy, budgetary or revenue control, and capacity to inspire an overall vision.[18] As this report focuses on the implications of setting an operational carbon neutrality goal, the primary focus is on owned and operated facilities and internal policies, budgets, and visions.

- **Cost Effectiveness:** As a public entity funding is likely to always be a constraint of the organization, which makes various considerations such as cost effectiveness critical. However, interviews also revealed a desire for a trend towards "cost reasonableness" over the simplification of aiming for the most cost-effective option. The concept behind cost reasonableness is not that it is necessarily the cheapest option, but that it is financially within reason with other criteria also being given significant weight.

- **Implementation:** Building on existing frameworks, processes, or current King County positions makes a large difference in the feasibility as it reduces up front impacts. It is easier to build off of building blocks that already exist than start from scratch.

- **Flexibility:** Interviews highlighted the need for a carbon neutral goal to provide feedback that can be incorporated to foster continuous improvement. It is also important to retain the ability to adapt to new technologies as they become available.

---

[17] "Carbon Neutral Government Year in Review 2016." Ministry of Environment and Climate Change Strategy, 2016 https://www2.gov.bc.ca/assets/gov/environment/climate-change/cng/yir/2016-cng.pdf.
[18] "CNCA: Framework for Long-Term Deep Carbon Reduction Planning" (Copenhagen: Innovation Network for Communities, June 2014), https://www.usdn.org/uploads/cms/documents/cnca-framework-12-2-15.pdf?source=http%3a%2f%2fusdn.org%2fuploads%2fcms%2fdocuments%2fcnca-framework-12-2-15.pdf.

- **Departmental Burden:** In order for any carbon neutral goal to be achieved all departments must be engaged and integrate sustainability throughout their activities. However, it is critical that support be provided as necessary and undue burdens that might compromise a department's ability to deliver on their primary focus area be avoided. The steps required to achieve a carbon neutral goal need to be equitable across the diverse operational units of King County activities.

3.3 Alignment with King County Priorities

Sustainability and emission reduction goals must be paired with other strategic goals throughout the County, so that they are not isolated from or in competition with other priorities. For this analysis three subcomponents are explicitly addressed, including equity and social justice, service improvements and maintenance, and economic development.

- **Equity and Social Justice:** The *King County Equity and Social Justice Strategic Plan* requires investing upstream, where needs are greatest, in community partners, and in employees with transparent and accountable leadership.[19]

- **Service Improvements and Maintenance:** King County is dedicated to offering high quality and reliable services to the community. Climate action goals should increase that level of service or at minimum maintain it.

- **Economic Development:** King County operational goals should, to the extent possible, foster economic development and new jobs within King County's geographic borders. However, it is acknowledged that many projects with significant climate impacts will not always be feasible to build in King County.

3.4 Community and Partner Engagement

King County as a community has over 30 municipal jurisdictions, 2 million residents as of the 2017 census, and over 79,000 distinct business units.[20] Setting an operational carbon neutral goal is also a means to demonstrate leadership to the businesses, cities, and communities within King County. This criteria has four subcomponents: support of community emission goals, replicability, financial stewardship, and public perception.

---

[19] "Equity and Social Justice Strategic Plan - King County," accessed April 29, 2018, https://www.kingcounty.gov/elected/executive/equity-social-justice/strategic-plan.aspx.
[20] "King County Strategic Climate Action Plan: 2015 Annual Report." King County, June 2016

- **Community Emission Goals:** The County currently has community emission goals of a 25% emission reduction from a 2007 baseline by 2020, 50% reduction by 2030, and 80% reduction of community emissions by 2050 (80x50 framework). Operational carbon neutral goals provide one means to contribute to communitywide reductions. Many of the choices made by County operations directly impact the emissions of the community.

- **Replicable:** While a carbon neutral goal will be tailored to the operations of any individual organization, the strategies used can still be replicable if relevant to other jurisdictions. This is especially true for any other jurisdictions with similar operational units to King County, such as a large bus fleet or active landfill. Interviews revealed a consistent belief that public organizations should work together with each other and with local businesses to share lessons learned and best practices. Collaboration was seen as critical to effective public sector climate mitigation efforts.

- **Financial Stewardship:** As a public entity, King County is entrusted by taxpayers to use financial resources to benefit the community that it serves. A key component of financial stewardship is the transparent and responsible use of public funds.

- **Public Perception:** As a public sector organization responsive to public trust and citizen voting, by ballot or election, public perception is essential. The two primary parts of public perception are accessibility, or a goal that the public can readily understand, and accountability, which is demonstrated through progress towards established goals.

Part 4: How to Set a Carbon Neutral Goal

This section of the report walks through the five key questions that an entity must ask in considering how to set an ambitious carbon neutral goal. In Part 5 a comparison table is provided that outlines how other organizations approach these five questions or components.

In interviews conducted there was general agreement that a carbon neutral goal should only be set if it is realistic about what it will accomplish or incentivize. Additionally, many interviewed expressed skepticism about the value of a carbon neutral goal due to the variety of ways to reach carbon neutrality. Some argued that a carbon neutral approach may create more questions than answers. This is why one must be explicit about why a carbon neutral goal is being set, the intention behind it, and how it will be reached. This also provides transparency to the public, an essential ingredient in setting and implementing such a goal for local government.

Next, many of those interviewed argued that if communicated and implemented well, a carbon neutral goal can have leadership and political value that can catalyze public debate, encouraging further action in the community and beyond. On a practical level, a carbon neutral goal may provide focus and push mitigation efforts ahead faster than they might otherwise. Tracking progress toward a goal is critical to enthusiasm and employee buy-in. Some interviewees highlighted that one benefit of a carbon neutral framework is that it does not require comparisons to historical baselines like a reduction goal necessitates. Instead an entity must address all carbon emissions within a set boundary, which may be more readily accessible to employees. Still the question remains, how should a carbon neutral goal be defined and set to incentivize more ambitious climate action?

4.1 Question 1: How should carbon neutral be defined?

There is no universally accepted definition of carbon neutrality, though on a basic level, "carbon neutral" refers to having no net carbon emissions. Becoming carbon neutral is an admirable achievement for an organization, though more complicated than it may initially appear.[21] Strategies for direct and indirect emissions reductions may vary drastically depending on the carbon neutral definition being applied by the organization.

There are two primary definitions of "carbon neutrality", absolute carbon neutrality and carbon net neutrality, though the term is often used interchangeably for both. Absolute neutrality only

---

[21] "COP21 Glossary of Terms Guiding the Long-Term Emissions-Reduction Goal | World Resources Institute." Accessed March 7, 2018. http://www.wri.org/blog/2015/12/cop21-glossary-terms-guiding-long-term-emissions-reduction-goal.

relies on direct reductions of all emissions within the boundary, whereas carbon net neutral includes indirect reductions, such as the purchase of verified offsets to balance out remaining emissions (see definitions in Table 4 below). Most organizations cannot currently reach absolute carbon neutrality given available infrastructure, so they often purchase indirect emission reductions to achieve a carbon net neutral goal instead.[22]

Table 4: *Definitions & Examples of Carbon Neutral Goal Types*

Goal Type	Description	Example
Absolute Carbon Neutral	Direct emission sources are equal to or less than emissions reductions/removals. Absolute means no indirect sources, such as offsets, are used. All emissions are within the organizations GHG boundary.	This is the most all-encompassing goal and very difficult to achieve; an example is the City of Fort Collins, Colorado.
Carbon Net Neutral	Balance of direct emission sources with emission reductions/removals. If direct sources are larger than reductions, the net difference is covered through the purchase of indirect emissions reductions, such as offsets.	A common goal type, adopted by City of Seattle, British Columbia and many companies among others.
Fossil Fuel Free	No use of fossil fuels (e.g. coal, oil and natural gas). This goal aims for stationary power sources and a fleet that exclude fossil fuels and its related particulates; the power source may include nuclear power as it does not produce GHGs.	Several cities and universities have made this a long-term goal by 2050, including Harvard and the City of Copenhagen.
Zero-emissions	No tailpipe GHG or air pollutant emissions from fleets. May or may not specify that power is from renewable energy sources. Examples are all-electric or fuel cell vehicles.	King County's 2017 Metro report outlines how its bus fleet can operate with zero-emissions by electrifying by 2040 at the latest.
Deep De-Carbonization (often 80% by 2050)	Ambitious level of emissions reductions implied by the 2015 Paris Agreement, which requires significant direct reductions within boundary. Reduction does not involve balancing but rather reducing against a set baseline year.	King County's 2015 SCAP aims for an operational reduction of 50% by 2030 and a communitywide reduction of 80% by 2050.
100% Renewable	Electricity production from renewable sources including solar, wind, biomass, energy efficiency, and hydropower. May or may not be directly owned by entity. May or may not include both environmental attribute and power	Companies like Microsoft and Amazon employ this goal, developing or buying

---

[22] Jake Schmidt, "Tracking Carbon with Transparency: Improving Accuracy and Accountability in the International Global Warming Agreement," Climate Facts (NRDC, November 2010), https://www.nrdc.org/sites/default/files/trackingcarbon-fs.pdf

	(e.g. power purchase agreement), or just environmental attribute (e.g. RECs).	renewable projects to power operations directly.
Carbon Negative	Removing more CO_2 emissions from the atmosphere than an entity is responsible for creating, commensurate with historical contribution to climate change. This can be achieved by purchasing excess renewable electricity, by sequestering more carbon, or by buying more offsets than are required. **	The County's Dept. of Natural Resources & Parks has reached carbon neutrality but continues to sequester carbon to go "beyond carbon neutral."
**	Includes indirect reductions, where other goals do not.	

A carbon neutral goal does not necessarily have to refer to just zeroing out net emissions as many interviews revealed the importance of incorporating climate equity concerns into the framework. Climate equity advocates emphasize that the developed world is primarily responsible for emissions that are already in the atmosphere and in general, there is increasing recognition of climate equity in mitigation efforts globally.[23] Some individuals interviewed suggested that the developed world's ethical burden of reductions must go beyond carbon neutral. A burden-sharing approach considers both historic emission outputs as well as an organization's capacity to pay for emission reductions.[24] It suggests that a government like King County should consider going further than carbon neutral, to **"carbon negative"** for example, in which there are net negative emissions as defined in Table 4. However, it is unclear, especially for public entities, if this is feasible now or in the future.

The 2015 Paris Agreement objective is a maximum global average temperature rise of 1.5°C to 2°C. This translates into worldwide emissions falling by roughly 80% by 2050 (80x50) compared to a 2005 baseline.[25] Many climate scientists believe that 80% by 2050 is achievable without offsets or indirect reductions. Cities around the world are beginning to adopt this **deep decarbonization goal**[26] in accordance with the Carbon Neutral Cities Alliance's (see the CNCA case study in the Appendix). Multiple interviewees noted that an 80% reduction by 2050 goal is functionally similar to a carbon neutral goal, as both require large investments in transformative change.

The City of Seattle has set a long-term communitywide **carbon net neutral goal** for 2050, acknowledging that it will likely need to buy offsets to reduce the last 10% of its emissions,

[23] "Developing Countries Need Urgent Support to Adapt to Climate Change | UNFCCC." Accessed May 27, 2018. https://unfccc.int/news/developing-countries-need-urgent-support-to-adapt-to-climate-change.
[24] Erickson, Chandler, Lazarus. "Considerations of Global Equity and Burden-Sharing in Community-Scale Climate Action Planning." Stockholm Environment Institute, December 2010
[25]"First Long-Term Climate Strategy Submitted to UN Under Paris Agreement | UNFCCC," accessed May 5, 2018, https://unfccc.int/news/first-long-term-climate-strategy-submitted-to-un-under-paris-agreement
[26] Lazarus, Erickson, Chandler, Kollmuss. "Defining Carbon Neutral in Light of Community-Scale emissions reduction goals." SEI, September, 2010.

according to a feasibility study conducted in 2011.[27] By contrast, British Columbia set a near-term goal of carbon net neutrality for provincial governments by 2012 and many BC local governments followed suit. Overall, in BC 31% or 174 of reporting provincial governments achieved a carbon neutral status in 2015. [28]

Harvard University deliberately adopted a long-term **fossil fuel free goal** because of the ability to include concerns related to particulate matter. In addition to creating GHG emissions (carbon dioxide and methane), diesel and gasoline powered fleets emit other harmful air pollutants including ozone, lead, diesel particulate matter, carbon monoxide, sulfur oxides, and nitrogen oxides, pollutants that can harm human health and the environment.[29] In 2012, 23% of emissions were non-CO_2 greenhouse gases according to the World Resources Institute.[30] The City of Seattle's April, 2018 Climate Action Plan (CAP) update uses the term "fossil fuel free," a term that is increasingly being used for campaigns and CAPs, perhaps because it resonates with the public.[31] The City of Copenhagen in Denmark and Harvard University both have a goal to be fossil fuel free by 2050.

While some entities set one goal type, others use **multiple goals** or switch midstream to better fit their priorities or business models. For example, Google became carbon net neutral in 2007 and in 2017 achieved 100% renewable operations.[32] Similarly, since 2012 Microsoft has been carbon net neutral across its operations and is beginning to green its power source toward a 100% renewable goal.[33] In conclusion, there are many goal options and organizations must assess what makes sense based on their priorities and what will resonate with decision makers, the general public, and employees.

4.2 Question 2: Where should the boundaries be drawn?

In terms of GHG emissions, a boundary refers to how decisions are made regarding which emissions are included or excluded from the GHG inventory. Boundaries are drawn in many ways including operational or communitywide, emission scopes (1, 2 and 3), geographic boundaries, owned and operated facilities, and by type of GHG. Interviews revealed that it is

---

[27] Lazarus, Erickson, Chandler. "Getting to Zero: A Pathway to a Carbon Neutral Seattle." SEI, May, 2011. https://www.seattle.gov/Documents/Departments/OSE/CN_Seattle_Report_May_2011.pdf

[28] "BC Climate Action Charter | BC Climate Action Toolkit." Accessed March 6, 2018. http://www.toolkit.bc.ca/BC-Climate-Action-Charter.

[29] National Equity Atlas. 2016. Air pollution: Unequal burden. http://nationalequityatlas.org/indicators/Air_pollution%3A_Unequal_burden

[30] Levin, Song, Morgan. "COP21 Q&A: What Is GHG Emissions Neutrality in the Context of the Paris Agreement?" December, 2015. www.wri.org/blog/2015/12/cop21-qa-what-ghg-emissions-neutrality-context-paris-agreement

[31] "The NEW Fossil Free." 350.org. Accessed May 27, 2018. https://350.org/you-are-part-of-a-global-fossil-free-movement/.

[32] "Google Environmental Report: 2017 Progress Update." Progress Report. Google, 2017. https://storage.googleapis.com/gweb-environment.appspot.com/pdf/google-2017-environmental-report.pdf.

[33] DiCaprio, Tamara. "Becoming Carbon Neutral: How Microsoft Is Striving to Become Leaner, Greener, and More Accountable." Microsoft Corporation, June 2012.

common for boundaries to be drawn based on an organization's ability to consistently and accurately quantify emissions.

4.2.1. Operational vs. Communitywide Emissions

Operational emissions refer to the facilities, fleets, and other services that are owned and operated by King County. Major sources of GHG emissions from the County's operations include those from the combustion of diesel and gasoline fuel by transit buses and fleet vehicles, methane from Cedar Hills landfill, electricity used in buildings (especially in Puget Sound Energy territory), wastewater treatment, and the production, use, and disposal of government-purchased goods and services associated with capital and operational practices.[34] **Communitywide emissions** refer to the emissions released within a geographic boundary by the community at large. King County is exploring an operational carbon neutrality goal and as a result operational emissions are the primary focus of this report.

While community emission goals are outside the realm of this report community emissions are integrally tied to operational goals. Addressing communitywide emissions is arguably a more transformative goal. Interviews revealed that operational goals are frequently seen primarily as a means of supporting the more ambitious community goal. They also commented that reducing emissions for the operational footprint is a critical first step to inspiring community action. By demonstrating that the government can achieve ambitious reductions it provides a feasibility case study for local companies and residents to help them engage in communitywide emission reduction targets.

4.2.2 Creating the Boundary of a GHG Inventory and Goal

A critical piece of setting a carbon neutral goal is knowing the emission sources within the boundary, which requires a GHG inventory. A GHG inventory is a full accounting of atmospheric emission sources and removals from sectors such as waste, energy, product use, agriculture, land use, and industrial sectors.[35] The *GHG Protocol for Public Sectors* recommends that inventories be complete with all emission sources and activities, enable tracking of reduction progress over time, provide a transparent and clear methodology that is easily verified externally, and result in an accurate inventory. Within these inventories, organizations must choose whether to include different types of emissions, which fall into three scopes as outlined in Table 5.

---

[34] "Strategic Climate Action Plan (SCAP)." King County, November 2015
https://your.kingcounty.gov/dnrp/climate/documents/2015_King_County_SCAP-Full_Plan.pdf.
[35] "What Are Greenhouse Gas Inventories?," Accessed May, 2018, http://bigpicture.unfccc.int/content/transparency/what-are-greenhouse-gas-inventories.html.

Table 5: *Scope Definitions with King County Example*

Scope	Description	Examples in King County
Scope 1	Direct GHG emissions from operations, controlled by the entity	Emissions from fuel combustion in County operated buses or gases released from the Cedar Hill Landfill, owned and operated by the County.
Scope 2	Indirect GHG emissions created by the purchase of energy supply to power operations	Emissions released from the use of energy supplied by owned sources of natural gas or purchased from suppliers like Puget Sound Energy, whose electricity fuel mix is 59% fossil-fuel based.
Scope 3	All other indirect emissions both up and downstream	Emissions from employee commutes to work, business travel, contracted operations like waste haulers, and business travel for example. Reduction examples include avoided transportation by using transit and increased public recycling by County solid waste programs.

The *GHG Protocol for the Public Sector* states that scopes 1 and 2 must be accounted for separately by all governments.[36] Scopes 1 and 2 are standard across all sectors and are generally easier to quantify and more directly controlled. Scope 2 emissions are indirect but can be directly impacted by energy efficiency projects, conservation campaigns, or other similar organizational activities. By contrast scope 3 emissions are indirect and have low levels of direct organizational control. They are also far more difficult to quantify. The majority of interviewed organizations excluded scope 3 emissions from current goals. However, some used strategic inclusions that are quantifiable or unique to the organization. Examples of scope 3 emissions that other organizations include in their boundary or at least track in their inventory are:

- Business Travel
- Employee commuting to and from work
- Emissions from contracted services
- Paper emissions
- Purchased goods and services[37]
- Embodied emissions (especially for consideration in infrastructure)
- Up and downstream transportation and distribution

---

[36] Ibid.

[37] "Greenhouse Gas Data Management: Building Systems for Corporate/ Facility-Level Reporting," Technical Note, Partnership for Market Business (International Bank for Reconstruction and Development/ The World Bank, 2016), https://openknowledge.worldbank.org/bitstream/handle/10986/23741/K8658.pdf?sequence=5&isAllowed=y.

- Franchises
- Investments
- Capital goods
- Fuel and energy activities not included in scopes 1 and 2
- Upstream leased assets
- Use and end of life of sold products[38]

In British Columbia, the scope 3 emissions included in its operational carbon neutrality goal are primarily business travel and emissions from paper consumption. [39] The scope 3 emissions included were selected based on what can be readily measured and what encourages employee behavior and engagement in reducing emissions. Additionally, business travel, largely by flight, is included across many organizations because of the level of impact. In the United States the aviation industry accounts for 11% of all transportation emissions.[40] Carbon calculators specific to airfare travel have been developed to allow individuals and businesses to have transparency into the carbon footprint of their travel.[41] Many organizations across sectors have decreased their business travel related emissions by adopting technology and policies like teleconferencing to minimize commuting.

It is becoming a best practice to try to include scope 3 within the GHG inventory, but not within the boundary of the goal itself. GHG inventories have grown in their analytical power and accuracy since the early 2000's, but still need to improve for scope 3 accounting to reliably track emission reduction progress. Universities like Yale and Harvard that have adopted a carbon neutral goal are limiting their goal boundary to scopes 1 and 2, but are working diligently to understand and quantify scope 3 in their inventory. Many organizations are considering including scope 3 gradually over time as accurate data and standard practices become more readily available.

Other scope 3 emissions frequently included are embodied emissions, especially for construction projects which are common within the infrastructure heavy public sector. Embodied carbon refers to the GHG emissions that is released due to the manufacturing and transportation of materials, but also includes emissions related to disposal at the end of the

---

38 "Technical Guidance for Calculating Scope 3 Emissions (v. 1.0): Supplement to Corporate Value Chain (Scope 3) Accounting and Reporting Standard" (World Resources Institute and World Business Council for Sustainable Development, 2013), http://ghgprotocol.org/sites/default/files/ghgp/Scope3_Calculation_Guidance.pdf.
39 "Carbon Neutral GOVERNMENT Year in Review 2016." Ministry of Environment and Climate Change Strategy, 2016. https://www2.gov.bc.ca/assets/gov/environment/climate-change/cng/yir/2016-cng.pdf.
40 Tatiana Schlossberg, "Flying Is Bad for the Planet. You Can Help Make It Better.," *The New York Times*, July , 2017, sec. Climate, https://www.nytimes.com/2017/07/27/climate/airplane-pollution-global-warming.html.
41 Stiftung myclimate, "Offset Your Flight Carbon Footprint – with CO2 Calculator from Myclimate," accessed April, 2018, https://co2.myclimate.org/en/flight_calculators/new.

materials' useful life.[42] The building industry and building certifications like LEED Platinum, the current King County adopted standard for new buildings, largely focus on operational emissions to date. Embodied carbon has been found to be as little as 20% of the buildings total lifecycle emissions or as much as 80% of lifecycle emissions in some building types.[43] Embodied carbon accounting is a carbon accounting tool similar to life cycle analysis in the financial sector.

The importance of embodied carbon is also why some organizations, including King County, have considered adopting a consumption-based inventory for purchasing of goods and services. King County's traditional community GHG inventory is 23.4 million metric tons of carbon dioxide equivalent (mmtCo2$_e$), which increases to 55 mmtCo2$_e$ using a consumption-based inventory.[44] The County has control over selecting consumed or purchased goods to some extent, however it is difficult to influence the emissions of individual products. A consumption-based inventory greatly expands the boundary and reduction efforts necessary to meet a carbon neutral goal.

To date, the County, when doing departmental or community emissions, has tried to be holistic in its inventory approach. This has included a consumption-based inventory as part of the department specific inventory for DNRP, a department currently carbon neutral for operations. A consumption-based inventory is largely based off of what is purchased by the County and does not entirely fit within the scope model.

King County emission tracking efforts currently include:

- Environmental purchasing policy
- 100% recycled paper target
- Embodied emissions from the production of fossil fuel
- The purchase and use of low GHG cement alternatives.

4.3 Question 3: How to set a timeline for a carbon neutral goal?

The temporal element of an operational carbon neutral goal plays a critical role in determining both feasibility and ambition. There are three components related to the goal that interact to change level of impact and feasibility: target year (applicable to all goals), baseline (exclusive to reduction goals), and duration (primarily used in carbon neutral goals). These key choices for

---

[42] Wynn, Danielle. "Embodied Carbon - Q&A with Sean Lockie." March, 2012. https://www.fgould.com/uk-europe/articles/embodied-carbon-q-sean-lockie-director-carbon-and-/
[43] Wheating, Natalie. "Embodied Carbon: A Framework for Prioritizing and Reducing Emissions in the Building Industry." USF, 2017. https://repository.usfca.edu/cgi/viewcontent.cgi?referer=https://www.google.com/&httpsredir=1&article=1574&context=capstone.
[44]Ibid.

decision makers provide a balance of near-term technical feasibility and longer-term ambitious goals.

4.3.1 Choosing a Target Year

Target year is the year by which an organization is committing, or attempting to, reach its established goal for emission reductions. It is increasingly common for organizations to set both interim and long-term goals to get at the benefits inherent in both. In the 2015 SCAP King County's operational reduction goals are a 25% reduction by a 2020 **target year**, 50% by a 2030 target year, and 80% by a 2050 target year all reduced from a 2007 **baseline year**. The immediacy of the target year can impact the successful execution of the goal by changing various elements like the level of employee motivation, saliency of goal, allowing for technology innovation, capacity to allocate resources (including finances), and whether indirect emission reductions will be considered.

International Council for Local Environmental Initiatives (ICLEI) provided a list of over 400 public organization emission reductions goals with target years throughout the world. Analysis of the dataset revealed that on average the public entities allowed themselves just under 10 years to reach their goal with a standard deviation of approximately 8 years (see Figure 3 for a complete distribution).
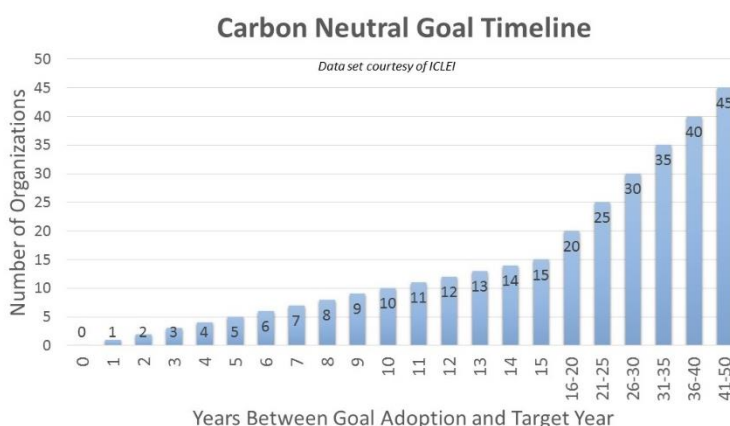
Figure 3: Analysis of public sector target years as provided by ICLEI.

The distance likely demonstrates the tradeoff between providing time for implementation and ensuring the goal is close enough to provide accountability.

4.3.2 Choosing a Baseline Year for Emission Reduction Targets

Baseline years allow organizations to measure emission reduction progress over time compared to a starting point. Organizations typically use one of three paradigms to establish baseline years: political year of significance, first GHG inventory, or a science-based target.

- **Political Year of Significance:** A primary example is the year 1990, which reflects goals established in the Kyoto Protocol adopted by many countries in 1997.[45] Political baselines help entities to track progress related to public commitments, such as those

---

[45] "Kyoto Protocol." Kyoto Protocol, 2014. http://unfccc.int/kyoto_protocol/items/2830.php.

made to the international community. The City of Portland's goals are for a 40% reduction by 2030, and an 80% reduction by 2050 from a 1990 baseline year for community emissions.[46]

- **First Reliable GHG Inventory:** GHG emission accounting best practices have improved greatly in the decades since the passage of the Kyoto Protocol. As a result, many organizations including King County use their first reliable GHG inventory as their starting baseline. Inventory baselines allow for greater accuracy and progress quantification, especially on an ongoing basis. Organizations of all types started inventories in earnest in the early 2000's, but many are still completing their initial inventory to date.[47] The City of Aspen uses their first GHG inventory, which was completed in 2004.

- **Science-Based Target:** One practice that is becoming increasingly common among organizations with established and ambitious emission reduction programs is a Science-Based Target. For a Science-Based Target the entity focuses, not on a baseline year, but on establishing emission reduction targets and timelines that align with what is necessary to prevent a global temperature increase of 2 degrees Celsius compared to pre-industrial temperatures. While the baseline is still required, it is not the focus of the strategy. A Science-Based Target focuses on the level of transformation and will inherently require a much higher target than other baseline methods. Over 400 companies have committed to a Science Based Target, which is set by sector and doesn't currently exist for the public sector. [48]

---

[46] "Climate Action Plan | The City of Portland, Oregon," accessed May 4, 2018, https://www.portlandoregon.gov/bps/49989.

[47] "Carbon Neutral Cities Alliance: Framework for Long-Term Deep Carbon Reduction Planning." Copenhagen: Innovation Network for Communities, June 2014. https://www.usdn.org/uploads/cms/documents/cnca-framework-12-2-15.pdf?source=http%3a%2f%2fusdn.org%2fuploads%2fcms%2fdocuments%2fcnca-framework-12-2-15.pdf

[48] "What Is a Science-Based Target? | Science Based Targets." Accessed March 6, 2018. http://sciencebasedtargets.org/what-is-a-science-based-target/.

Emissions have continued to increase substantially since 1990, in tandem with both economic and population growth in many cases. Choosing a baseline year of 1990 compared to a more recent target year of 2007 for a reduction goal makes a substantive difference in the level of

emissions that must be reduced (see Figure 4 for a visual representation). For example, British Columbia has a baseline year of 2007 for their emission reduction goals and has achieved communitywide emission reductions of 7%. However, when compared to 1990 levels their communitywide emissions have increased by 22%.[49] Given the positive momentum of emissions within most boundaries, initial efforts at reduction may appear only by slowing the rate of emission growth, as opposed to a reduction from the baseline.
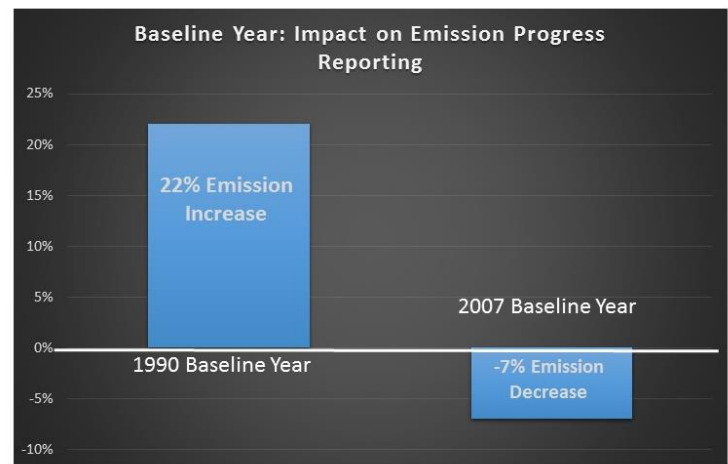

Figure 4: *British Columbia emission reduction progress in 2012 compared to two baselines.*

4.3.3 Choosing the Duration for a Carbon Neutral Goal

A carbon neutral goal requires a duration as the temporal element for comparison, instead of the baseline year necessary for GHG reduction targets. Inventories for emissions are generally conducted to enable tracking year over year, which also makes it common to set the carbon neutral temporal boundary at one year. [50] The aim is to have emission removals be equal or greater than emission sources within the set GHG boundary (see Section 4.2). If not, then purchasing indirect emission reductions (See Section 4.5) would be required to compensate for the remaining emissions.

For example, British Columbia defines its carbon neutral government according to an annual cycle, a common duration for governments. This requires the government to measure emissions, directly reduce what they can, offset remaining emissions, report on all emission related activities, and verify their carbon accounting practices each year. At present, the County tracks operational emission progress on an annual or semi-annual basis depending on when it can obtain the necessary data.

---

[49] Kazi Stastna, "How Canada's Provinces Are Tackling Greenhouse Gas Emissions | CBC News," CBC, April , 2015 www.cbc.ca/news/canada/how-canada-s-provinces-are-tackling-greenhouse-gas-emissions-1.3030535.
[50] "The CarbonNeutral Protocol: The Global Standard for Carbon Neutral Programmes" (Natural Capital Partners, January 2017), https://assets.naturalcapitalpartners.com/downloads/The-CarbonNeutral-Protocol-Jan2017.pdf.

4.4 Question 4: What direct emission reductions should be prioritized?

There is a wide spectrum of options for direct emission reductions. Strategies include decreasing or eliminating use of fossil fuels by increasing energy efficiency in fuels and buildings, increasing deployment of renewable energy, increasing electrification, reducing waste, and also reducing the intensity of products purchased or consumed.[51] Most of these strategies will require substantial financial investment.

A useful tool for comparing GHG emissions reduction strategies touted by climate program managers and scholars is the Marginal Abatement Cost Curve (MACC). The sample MACC in Figure 5 illustrates the cost effectiveness of a selection of GHG emissions reduction strategies in the United States.[52] Cost effectiveness is one criteria used later in the report that assesses the best reduction tools or activities. In the MACC, the width of

Figure 5: Marginal Abatement Curve from Cost King County SCAP

each bar is the emissions reduction – the wider the bar the greater the GHG emissions reduction. The height of each bar represents the "marginal abatement cost" or the cost of reduction per metric ton of carbon dioxide equivalent; the taller the bar, the higher the cost of each avoided metric ton of emissions. If the bar is below the line, then it is potentially a profitable emission reduction strategy that will save the County money, while those above the bar require budget allocation and an expenditure. While some projects like energy efficiency may save the County money, continued reductions will require substantial funding over time.

4.4.1 Energy Efficiency

In reducing emissions directly, tackling any and all energy efficiency efforts early on is key, as these are typically more cost-effective reduction methods. King County is committed to being a leader in promoting energy conservation. Operationally, the County is on track to reach its energy efficiency goal of reducing energy use in its owned facilities by 10% by 2025 compared to 2014 levels.[53] Roughly two-thirds of the County's built environment in 2050 is expected to be constructed between 2007 and 2050, creating significant opportunities for large emissions

---

[51] King County SCAP, 2015. King County, 2016
[52] King County SCAP, 2015. King County, 2016
[53] Performance Update - 2016 Snapshot. King County www.kingcounty.gov/services/environment/climate/strategies/progress-report.aspx

reductions.[54] Reducing the building and facility energy use goal area outlined in the SCAP could be achieved by electrifying facilities to remove natural gas and adopting net zero energy buildings.

Google's Energy Efficiency Efforts

Google is an example of an organization that is aggressively targeting unique parts of its business with high-impact energy efficiency efforts.[55] Internally, Google is working towards two main goals.

1. Designing Efficient Data Centers:

- Maintain/improve quarterly power usage effectiveness at its data centers
- Achieve zero waste to landfill for global data center operations
- Maintain ISO 50001 energy management system certification for all Google-owned data centers (they missed this goal getting 12 of 14 certified, but covered 98% of their IT energy use)

2. Creating Sustainable Workspaces:

- Pursue LEED certifications for all facilities
- Reduce single occupancy vehicle use at headquarters to 45%
- Reduce employee waste by 10% (only reached 2% so far)
- Create regional waste reduction targets for all offices
- Reduce potable water consumption per employee by 40% from 2013 – 2016 (goal achieved)
- Create regional water reduction targets

4.4.2 Transportation

The majority of the County's operational emissions come from its Metro transit fleet. According to the County's 2016 progress report, the County is behind on most of its operational transportation goals: [56]

- ***Behind*** - County vehicle fuel use (excluding Metro Transit) increased 1.5% compared to 2014; the goal is to decrease fuel use 10% by 2020.

---

[54] Ibid.
[55] Google Environmental Report: 2017 Progress Update." Google, 2017. Page 8. https://storage.googleapis.com/gweb-environment.appspot.com/pdf/google-2017-environmental-report.pdf.
[56] At the time of this report the 2017 progress report was being finalized. For more up to date information see: https://www.kingcounty.gov/services/environment/climate/strategies/progress-report.aspx

- *Behind* - Energy used per transit ride was up slightly compared to a 2014 baseline. However, Metro has added over 200,000 hours of service to accommodate future ridership increases.

- *Behind* - Total County vehicle miles traveled increased by 4.6%. Significant additional work will be necessary to hit the long-term target to reduce vehicle miles traveled by 20% by 2030.

- *On track* - Alternative fuel use in County vehicles increased over 65% in 2016 compared to the 2014 baseline and consists of 4.3% of all fuel used.

In order to directly reduce emissions to zero in this sector, three things are necessary - successful deployment of electric fleet technology, renewable electricity production that powers this fleet, and fleet efficiency or lower carbon fuels when electrification is not possible.

As one of the region's largest consumers of diesel fuel and the operator of a fleet of heavy-duty vehicles, Metro plays an important role in reducing County operational emissions. As Metro outlines in a 2017 feasibility report, a key strategy for reducing vehicle emissions is to integrate innovative technologies and lower-carbon fuels into its operations.[57] Metro has over 3,700 vehicles and its fleet of roughly 1,400 buses includes diesel and diesel-hybrid buses, electric trolleys, and battery-electric buses. Metro also operates the largest public rideshare program in the nation, with over 1,500 commuter vans and 24 electric vehicles. Overall reductions in emissions from a zero-emission fleet depend on the source of the electricity the vehicles use.[58] Achieving large-scale emission reductions requires pairing zero-emission vehicles with low to zero-emission electricity sources. Another method of reducing transportation emissions is to reduce County vehicle miles traveled, which most local governments interviewed have yet to achieve.

4.4.3 Carbon Pricing

An internal carbon pricing mechanism typically takes one of three forms, as outlined by the Center for Climate and Energy Solutions:

- **An internal carbon reduction fee** represents the monetary value of one ton of carbon emissions. Revenues from the fee provide a consistent mechanism to support and fund

---

[57] "Feasibility of Achieving a Carbon neutral or zero-emissions fleet." King County Metro, March 2017
[58] Ibid.

emission reduction efforts within an organization. The price for an internal carbon fee tends to range from $5-$20 per metric ton. [59]

- **A shadow price of carbon** is a financial analysis tool that provides support for long-term organizational investment and planning by internalizing the negative externalities of climate change. There is a significant range of shadow prices but on average they are typically higher than the current federal price of $10 per $mtCO_2e$.[60] Under the previous administration, the federal government's recommended shadow price was $71 per $mtCO_2e$.[61] Metro Vancouver adopted a shadow price of $150.

- **An implicit price** is derived from the cost of meeting government regulation or reducing an organizations' GHG emissions. However, this is not relevant to the King County's carbon mitigation efforts at this time.[62]

Carbon Fee

Microsoft is a regional example of an organization that implements an internal carbon reduction fee. With the revenue generated by this carbon fee, Microsoft claims to have purchased more than 10 billion kilowatt-hours (kWh) of green power, reduced emissions by 7.5 $mmtCO_2e$, and saved more than $10 million per year since it implementation.[63]

The carbon fee is a cornerstone to Microsoft's emission reduction activities. The revenues generated from Microsoft's carbon fee provide both an incentive for departments within the organization to make changes, and a way to pool funds to support investments in innovative solutions to reduce emissions. They also published a white paper that discusses what, why, and how to implement a carbon fee at any organization.[64]

Yale University provides another example of carbon fee implementation. Yale initially implemented a carbon fee mechanism as an applied research project. After a pilot project, the University began charging a fixed price for carbon output to 259 of its buildings in July of 2017.[65] Broken down by department, they apply a $40 charge for every $mtCO_2e$ emitted above the university's average. Units that emit more than Yale's university-wide average are charged for the amount they emit over the average, while units that emit less receive revenue back. This

[59] "Internal Carbon Pricing." Center for Climate and Energy Solutions (blog), October, 2017. www.c2es.org/content/internal-carbon-pricing/.
[60] Ibid
[61] "Executive Briefing- Operational Cost of Carbon" (Cost of Carbon Team, King County, January 29, 2018).
[62] "Internal Carbon Pricing." *Center for Climate and Energy Solutions* (blog), October, 2017. www.c2es.org/content/internal-carbon-pricing/.
[63] DiCaprio, Tamara. "Making an Impact with Microsoft's Carbon Fee: Inspiring a Virtuous Cycle of Environmental Investment and Action." Microsoft, March 2015.
[64] "Erasing Our Carbon Emissions | Microsoft Environment." Microsoft. Accessed May 2, 2018. https://www.microsoft.com/en-us/environment/carbon/our-approach.
[65] "Implementation | Yale Carbon Charge." Accessed May 2, 2018. https://carbon.yale.edu/implementation.

means that Yale's carbon fee is essentially revenue neutral to the University at large and helps to incentivize independent emission reductions by department.

A carbon fee mechanism can also be used to assess the cost associated with individual department emissions outputs, ultimately creating a shared climate budget payment. Currently this is something King County is considering. The major concern with a carbon fee resides in considering where the price is set and how the revenues are being reallocated to meet organizational priorities. This is an area that needs more research if King County is to consider embedding a carbon fee into their operations. Ultimately a price on carbon serves as a tool to monetize and better understand the impacts associated with an organizations' GHG emissions. Simultaneously, the price provides an incentive for change and action, promoting further direct reductions.

Shadow Price of Carbon

The County is currently considering adopting a shadow price of carbon at $71 per mtCO$_2$e. Including this cost allows agencies to make more informed decisions that protect both current and future generations. Using a shadow price of carbon can change the final recommendation when conducting a life cycle or benefit-cost analysis. Implementing a shadow price is meant to impact major decisions such as how to construct a building in a manner consistent with climate goals. For construction projects to be fully evaluated for climate impact, the embodied carbon that is within scope 3 must be included in the analysis (see Section 4.2).

4.4.4 Renewable Energy

Renewable energy refers to electricity that is either low carbon or produced without emitting GHG emissions, such as solar and wind power, waste biomass, and more controversial are nuclear and hydropower. Many companies and governments are beginning to develop and purchase their own renewable energy sources directly, in order to power their major energy needs GHG-free. There is some debate in the environmental community on whether nuclear power and hydropower should be counted as "renewable," but this debate is tangential to broader climate mitigation efforts. [66] In Washington State, renewable energy is

> Washington's **Renewable Portfolio Standard** was adopted in 2007 and utilities serving over 25,000 customers are required to meet the following targets: 3% of load must be served by renewable resources by 2012, 9% by 2016, and 15% by 2020. As of early 2017, the state legislature found that the 17 electric utilities that must comply are on track to meet the target of 15% of an annual renewable load by 2020.

---

[66] "Greens Question 95 % of Seattle City Light's Carbon-Free Electricity." Accessed March 18, 2018.
https://www.washingtonpolicy.org/publications/detail/greens-question-95-%-of-seattle-city-lights-carbon-free-electricity.

defined within the frame of "Eligible Technologies," namely geothermal electric, solar, wind, biomass, hydroelectric, landfill gas, tidal, wave, and anaerobic digestion among others.[67]

King County has provided leadership in reducing the percentage of fossil fuels present in Puget Sound Energy's (PSE) fuel mix by investing in new renewable energy projects.[68] When trying to reach its renewable energy purchasing goal, investing in wind power made sense for PSE. There was a guarantee that the wind power would be new, located in-state, and ideally create new clean energy jobs. This creates health, environmental, and economic benefits within the state. When the utility invested in a 135 megawatt (MW) new wind project, the County signed onto PSE's Green Direct program. By 2019, 98% of County facilities in PSE territory will be GHG-free due to these new agreements.[69] These are a type of power purchase agreement, which is considered one of the fastest ways to add new renewable energy to an electric grid.[70]

A **power purchase agreement** at its core is a contract between two parties where one party sells both electricity and renewable energy certificates (RECs) to another party, PSE to King County in this case. This is an example of direct emission reductions versus RECs, discussed in the next section, where only the environmental attribute is purchased but not the power.

King County will likely need a second Green Direct agreement to secure renewable energy for future expanded power needs (due to its electrified bus fleet), and this is an option that the County is already considering. It is important to keep in mind that the County's energy supply will become cleaner by default in the coming years, due to PSE's recent commitment to close part of its coal-fired power plant, Colstrip, by 2022.[71] In 2016, the utility's electricity mix included 9% wind power (see Figure 6),[72] which will be an increasing share, as will new solar investments, in part due to demand from large customers like King County, Target, REI, and others.[73] But at the communitywide scale, some
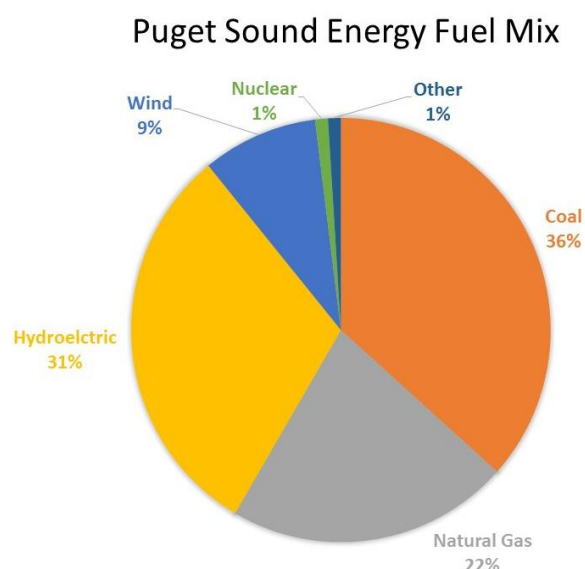
Figure 6: *Puget Sound Energy fuel mix as of 2016.*

---

[67] "RPS, Program Overview." DSIRE website. Retrieved from: http://programs.dsireusa.org/system/program/detail/2350
[68] PSE launches new renewable energy product in the Northwest." April, 2017 https://pse.com/aboutpse/PseNewsroom/NewsReleases/Pages/Governments-and-corporations.aspx
[69] According to PSE, other cities and some companies have also signed up with Green Direct, to cover all or part of their operations, including Anacortes, Bellevue, Snoqualmie and Mercer Island.
[70] "Renewable energy power purchase agreements." 3Degrees, Feb, 2018. 3degreesinc.com/ppas-power-purchase-agreements/
[71] "Puget Sound plan to shutter Colstrip coal units approved." Utility Dive, December 2017. www.utilitydive.com/news/puget-sound-plan-to-shutter-colstrip-coal-units-approved/512542/
[72] "Electric Supply," accessed May 4, 2018, https://pse.com/aboutpse/EnergySupply/Pages/Electric-Supply.aspx.
[73] "Resource Planning," accessed May 9, 2018, https://pse.com/aboutpse/EnergySupply/Pages/Resource-Planning.aspx.

interviewees believe that the County will need state-level action in order to get the County's electric generation fully fossil fuel free.

4.4.5 Removals

Removals refer to GHGs that are removed, stored or "sequestered" from the atmosphere by activities such as reducing waste, planting trees, and protecting forest and agricultural land. This is because forests, farms, and agricultural soils absorb and store carbon dioxide. King County and partners planted 117,925 in-boundary trees in 2016 and are ramping up a number of large-scale planting projects towards the one million trees goal for 2020. The County is making progress on this strategy, but has significant ground to make up to reach its target.

DNRP achieved carbon net neutrality in the fall of 2016.[74] This achievement was heavily dependent on carbon capture from planting 41,000 trees accounting for the removal of 114,000 metric carbon dioxide equivalent tons in 2015.[75] These and other internal efforts to remove carbon have allowed the department to become carbon net neutral according to internal standards. An external review of DNRP's accounting standards in 2016 recommended that the King County removals go through a third-party verification system to enable them to become a certified carbon offset. DNRP at this time has decided not to pursue formal offset accreditation due to cost and having no intention to create a tradable offset to sell to external entities.[76] Metro Vancouver provides another example of a removal project when they leveraged a large landfill gas capture project. The landfills were owned by City of Vancouver and City of Delta, and its credits were sufficient to balance all of Metro's cities to claim carbon neutrality in 2015.[77]

4.4.6 Waste Reduction & Materials Management

Other direct reduction tools include reducing consumption or waste and making green procurement or purchasing decisions. Though important, these activities are not covered in great depth here, as these tools are not considered transformative reductions at this time.

Below are progress reports of where the County stands in these goal areas. King County continued to decrease paper usage in 2016 but fell just below its 30% reduction target. In 2016, it diverted 77% of construction and demolition materials from landfills, falling just short of its 80% target for that year. Operationally the County is making progress in this area, however at

---

[74] "Beyond Carbon Neutral King County DNRP's 'Beyond Carbon Neutral' Commitment - October 2016."
[75] "Strategic Climate Action Plan" (SCAP). King County, November 2015.
[76] "Third Party Review of DNRP's GHG Accounting Approaches - King County," accessed April 2, 2018, https://www.kingcounty.gov/services/environment/climate/strategies/beyond-carbon-neutral/third-party-review.aspx.
[77] Metro Vancouver, "Net Corporate Greenhouse Gas Emissions," accessed May 5, 2018, http://www.metrovancouver.org:80/dashboards/services/air-quality/Pages/Net-corporate-greenhouse-gas-emissions.aspx.

the community-level it is having less success. For example, it is far from reaching its goal for 2030 for zero waste of materials.**78**

Materials management will be relevant to reducing scope 3 emissions in the future and minimizing operational resource use, maximizing reuse and recycling, and purchasing products and services with low environmental impacts. Thus far the County's goals in this area are limited in scope, but it has the benefit of actively engaging more County employees in carbon mitigation and should be ramped up over time.

4.5 Question 5: What indirect emission reductions should be included?

When emissions are not reduced directly, there is the option of reducing "indirectly" which refers to emission reductions outside the goal boundary (see section 4.2). A primary requirement as laid out by the Carbon Neutral Protocol for indirect emission reduction options is that they be additional. Being additional requires that the project demonstrate that in absence of the financial support provided, an emission reduction project would not have occurred. The intended result of this criteria is a tangible decrease in greenhouse gas emissions through projects that either avoid emissions or provide emission removals (see section 4.4.5).[79] Additionality is a point of contention and concern revealed through both interviews and the literature review regarding all indirect emission strategies.

4.5.1 Third Party Verified Carbon Offsets

Carbon offsets are generated by project-based activities aiming to reduce GHG emissions for which the credit can be transferred by purchase between organizations. Offsets are issued by governmental or nonprofit organizations via voluntary or mandatory compliance programs. Carbon offset projects can take a variety of forms. For example, at the Carbon Fund, projects fall into three categories: energy efficiency, forestry, and renewable energy. Its projects are located in Panama, Mississippi, and China among other locations.[80] The CarbonNeutral Protocol, an internationally respected carbon neutral certification body, defines offsets in the following way:

- **Offsetting:** "The practice of compensating GHG emissions by retiring or canceling carbon credits."

[78] "Strategic Climate Action Plan 2016: Performance Update. Goal Area 4: Consumption and Materials Management." King County, 2016. https://your.kingcounty.gov/dnrp/climate/documents/2016-SCAP-Goal-4-ConsumptionMaterials.pdf.

[79] "The CarbonNeutral Protocol: The Global Standard for Carbon Neutral Programmes." Natural Capital Partners, January 2017. https://assets.naturalcapitalpartners.com/downloads/The-CarbonNeutral-Protocol-Jan2017.pdf.

[80] "Home - Carbonfund.Org," accessed April 2, 2018, https://carbonfund.org/.

- **Carbon Credit:** "A transactable, non-tangible instrument representing a unit of carbon dioxide equivalent – typically 1 ton – that is reduced, avoided or sequestered by a project and is verified to an internationally recognized carbon accounting standard. Carbon credits are typically used to counterbalance or compensate for emissions occurring elsewhere."[81]

Offsets must meet the following requirements to be considered for CarbonNeutral Certification: additional, legally attributable, measurable, permanent, unique, and independently verified. [82] These values are relatively standard within certifying and verifying entities. Nevertheless, meeting this standard is a challenge. For example, the United Nations Clean Development Mechanism, the largest certification body in the world for offsets, audited 93 of its own projects and found that 40% of its offsets are questionable as to their additionality. [83]

In contrast, in a regulated cap and trade system, allowances are permits issued by a government that limit GHG emissions. Active programs exist in California and the East Coast. To date there is one Washington-based project that is certified as part of California's regulatory program. The project was developed over the course of three years by the Washington Environmental Council and Nisqually Land Trust to incentivize forest conservation in Washington State. The project required full documentation and extensive detailed calculations comparing the project to a baseline that is without the investment in order to meet additionality criteria.[84]

4.5.2 Renewable Energy Credit (REC)

A Renewable Energy Credit (REC) is a market-based instrument that provides the rights to the environmental, social, and other non-power attributes of renewable electricity generation.[85] The original purpose of RECs was to track compliance with mandated utility renewable generation quotas, but they are now also used in a voluntary context by companies to make claims that they have purchased renewable electricity. RECs are measured when 1 megawatt hour of renewable energy is created and distributed to the electric grid.[86] RECs theoretically

---

[81] "The CarbonNeutral Protocol: The Global Standard for Carbon Neutral Programmes." Natural Capital Partners, January 2017. https://assets.naturalcapitalpartners.com/downloads/The-CarbonNeutral-Protocol-Jan2017.pdf.
[82] Ibid.
[83] "California Compliance Offset Program: Climate Action Reserve," accessed April 2, 2018, http://www.climateactionreserve.org/how/california-compliance-projects/.
[84] "Carbon Projects," *WEC* (blog), accessed April 2, 2018, https://wecprotects.org/carbon-projects/.
[85] US EPA, OAR. "Renewable Energy Certificates (RECs)." Overviews and Factsheets. US EPA, February 5, 2016. https://www.epa.gov/greenpower/renewable-energy-certificates-recs.
[86] "Offsets and RECs: What's the Difference." Environmental Protection Agency, February 2018. www.epa.gov/sites/production/files/2018-03/documents/gpp_guide_recs_offsets.pdf.

convey the use of renewable energy that has been generated and act as a market-based instrument to incentivize growth in the renewable energy sector. This allows purchasers of RECs to claim the emission reduction benefit from renewable energy.

- **Voluntary RECs** are used by entities to claim they have "purchased" renewable energy in the absence of a regulatory mandate. Though widely used by many companies for this purpose, voluntary RECs lack environmental integrity and research shows that voluntary RECs are unlikely to deliver actual GHG reduction or environmental benefits and are thus uncertain as valuable indirect reductions.[87] Because voluntary RECs lack an additive requirement they have received considerable criticism in recent years from climate experts.

- **Compliance RECs** are used to demonstrate compliance with mandatory renewable quotas like Renewable Portfolio Standards for utilities.[88] There is slightly more confidence in the environmental integrity of compliance RECs generated from projects serving markets with a binding quota for renewable energy generation. Purchasing compliance RECs through a long-term contract may strengthen the assurance that the investment has led to additional emission reductions.

The local utility Seattle City Light for example, purchases offsets as well as compliance and voluntary RECs, all for slightly different purposes. It purchases offsets to address its annual carbon neutral status, which fluctuates each year depending on supply and demand; it purchases compliance RECs to address the state's renewable portfolio standard requirements for new renewable energy sources; and it purchases voluntary RECs as part of its small, residential Green Up program.[89]

4.5.3 Renewable Identification Numbers (RIN)

The Renewable Fuel Standard (RFS) is a federal program created in 2005 that requires transportation fuel sold in the U.S. to contain a minimum volume of renewable fuels. The RFS program created sellable RINS to account for the use of renewable energy in transportation. The purpose of RINs is to incentivize alternative fuels into the marketplace and track and

---

[87] "Is Your 'Green Power' Really Just 'Green Washing?'| Greenhouse Gas Management Institute." *GHG and Carbon Accounting, Auditing, Management & Training | Greenhouse Gas Management Institute* (blog), March 12, 2014. http://ghginstitute.org/2014/03/12/is-your-green-power-really-just-green-washing/.

[88] Lee, Kollmuss, Broekhoff, Gillenwater. "Comparison of Offsets and Renewable Energy Options." Stockholm Environment Institute and GHGMI. Unpublished report.

[89] "The Nation's Greenest Utility." Accessed June 2, 2018. http://www.seattle.gov/light/greenest/cleanhydro.asp.

account for their volume. Fossil fuel producers' compliance obligation consist of the market for RINs. A RIN is technically a serial number attached to renewable fuel that is produced. [90]

The EPA tracks how much renewable fuel is produced and used by monitoring and then retiring RINs when that fuel has been used. RINs ensure that the mandated volume of renewable fuel is used, by increasing the amount of biofuel mixed into conventional gasoline.[91] There is considerable controversy over the use of biofuels.

King County is already engaged in the RIN market as DNRP sells them from its production of biogas from landfills. Metro is now working to purchase renewable energy for its electric vehicles from the proceeds of the sale of RIN credits. In late 2016, the County Council authorized Metro to use RIN credits to sell the environmental attributes of powering its trolley and zero-emission fleet with renewable energy. It is currently awaiting the EPA's approval for this transaction, which has been delayed by the new federal administration. If the County sells the environmental attributes of the zero-emission fleet these reductions cannot be counted within its GHG inventory.

---

[90] "RINs and RVOs Are Used to Implement the Renewable Fuel Standard," Today in Energy, U.S. Energy Information Administration. Accessed March 18, 2018. https://www.eia.gov/todayinenergy/detail.php?id=11511.
[91] Ibid.

Part 5: Comparison of Carbon Reduction Commitments

This section consists of a literature review, casting a wider net to explore what entities other than County peer organizations are doing to reduce carbon emissions. Carbon reduction commitments are gaining momentum in recent years, with governments, corporations and universities increasingly setting or ratcheting up their reduction targets and/or setting carbon neutral goals. Throughout this literature review we found that governments tended to focus on political feasibility, private entities tended to focus on innovation, and universities tended to focus on data driven analysis of climate goals. This is true around the world and in the U.S. as well. For example, Climate Neutral Now is part of the UNFCCC and was created to help more individuals and organizations measure, reduce, and offset their carbon footprints in a simple, UN-certified method. However, there are various methodologies and protocols in use for measuring footprints and inventories, which is part of what creates confusion regarding carbon neutrality and carbon accounting practices.[92] Table 5 consists of summaries of several organizational goals.

---

[92] "Climate Neutral Now | UNFCCC," accessed May 9, 2018, https://unfccc.int/climate-action/climate-neutral-now.

Table 5: *Organization Comparison Table: Comparison of various entities and their established carbon neutral goals broken down by the five components of setting a goal: goal type, target year, boundaries, direct reduction strategies, and indirect reductions.*

King County	GHG Reduction & Renewable Energy	County Operations: 25% reduction by 2020; 50% by 2030 (compared to 2007). Countywide: 25% reduction by 2020, 50% by 2030, 80% by 2050 (compared to 2007)	Operations and Communitywide	Operations: Scopes 1 & 2; Countywide: Geographic based methodology	2007	SCAP implementation	None
King County Department of Natural Resources and Parks	Absolute Carbon Neutral	Achieved in 2016; first inventory taken in 2000.	**Operations**	All three scopes "to the extent possible"	2007	- Tree planting - Loop biosolids - Energy efficiency - Renewable energy	None
King County Metro	Zero-emissions & GHG Reduction	2040, by 2034 at the earliest	**Operations**	Scopes 1 and 2	2016	- Electrify its fleet - buses and trolleys - Purchase renewable power source for this new electrical load	None
City of Seattle	Carbon Net Neutral & GHG Reduction	Carbon neutral by 2050 and interim goal to reduce core emissions 58% by 2030 (first inventory in 1990). 1. Road Transportation & Land use - 82% reduction by 2030 2. Building energy - 39% reduction by 2030 3. Waste - 70% Diversion Rate by 2022 & 50% methane reduction by 2020	Communitywide	- Scopes 1 and 2 - Focused on areas the City has the most influence, and then "supporting" or helping with freight, air, industry	2008 (year of peak emissions)	~90% direct reductions possible: - Road transportation & land use - Buildings: proposed 2015 Energy Code (commercial) would increase the efficiency of new construction and substantial alternations of existing buildings - Waste	Estimated will need to reduce 10% of emissions with offsets in 2050.
Seattle City Light	Carbon Net Neutral & Renewable Energy	Achieved in 2005	**Operations**	Scopes 1 and 2	2008	- Renewable energy e.g. hydro, wind - Energy efficiency and conservation	Purchases offsets annually.
Microsoft	Carbon Net Neutral	- Carbon neutrality achieved in 2013, through purchase of indirect offsets - New goal made in 2017 to reduce operational emissions 75% by 2030.	**Operations**	- Scopes 1 and 2 - Green-e certification or as close as possible	2012	- Internal price on carbon - Encourage culture of sustainability across all departments	Purchases offsets annually.
Google	Carbon Net Neutral & Renewable Energy	- Carbon neutrality achieved in 2007 - 100% renewable energy as of 2017 - Maintain carbon neutrality for internal operations	**Operations**	- Scopes 1 and 2 - Working to begin reducing scope 3 emissions.	2007	- Pursue aggressive energy efficiency initiatives - Purchase significant amounts of renewable energy	Purchases offsets annually.
British Columbia	Carbon Net Neutral	Carbon Neutral since 2011 with annual reporting and offsetting.	**Operations**	Scopes 1, Scope 2, and limited Scope 3 emissions (including paper & business travel).	2007	- Buildings - Fleet	Heavily dependent and must be purchased within BC borders.
Copenhagen	Carbon Net Neutral & Fossil Fuel Free	Carbon net neutral by 2025. Fossil-fuel free by 2050.	Communitywide	Scopes 1 and 2	1990	- By 2025 ~74% of reductions from energy production, power and heat - "Mobility" will account for 11% of 2025 reductions: more public transportation & biking infrastructure.	May need to purchase up to 50% of total reductions for 2025 goal.
Carbon Neutral Cities Alliance (CNCA)	GHG Reduction at Deep De-carbonization levels	Transformative change of infrastructure at the City level to enable emission reductions of at least 80% by 2050, based on per capita calculations.	Communitywide	Boundary-based emissions within the community, quantified via baselines or per capita emissions.	Varies by City	- Speaking with a common voice - Creation of Innovation Fund - Focus on de-carbonizing and transforming to new low carbon economy	None

5.1 Governments

In government, it is primarily cities and some states or provinces that are committing to go carbon neutral. For example, British Columbia and Brazil's sixth largest state, Mato Grosso do Sul, have committed to operational carbon neutrality.[93] Some local governments are committing to operational carbon net neutrality, such as Vancouver, BC by 2012, Metro Vancouver (the area's county) by 2012, and Austin by 2020.[94] The City of Austin plans to meet its goal by purchasing offsets for remaining emissions, according to an internal memo issued in March of 2018. Austin's carbon footprint fell 75% between 2007 and 2016, primarily because the city-owned utility switched to renewables to power city-owned buildings. Its progress on reducing its city vehicles' carbon output has been slower, partially because operations rely heavily on trucks which are more difficult to electrify. The city will need to pay between $200,000 and $900,000 over the next three years for 40,000 to 60,000 metric tons of carbon at $5 to $15 per ton. Austin city leaders will make this decision as part of their budgeting process. In 2015 Austin adopted a second, communitywide goal to be carbon net neutral by 2050, in addition to its operational goal.

Other cities are similarly ambitious and also seek to be carbon neutral at the community level. These include Melbourne, Australia by 2020, Vaxjo, Sweden by 2020, Copenhagen, Denmark by 2025, London, United Kingdom and the American cities of Seattle, Fort Collins, Providence, Boston, and Cambridge by 2050.[95] Many of these cities concede that they will need to buy some offsets as the target year approaches. The City of Fort Collins in Colorado has a population of roughly 165,000, and though relatively small it has made significant climate mitigation progress. The city has a carbon net neutral goal on both a community and operational scale, and as of 2017 it has achieved a 17% reduction in emissions from a 2005 baseline according to an interview with climate staff.[96] These reductions were achieved in the context of a growing population and economy. Its largest improvement came from reducing community-generated solid waste emissions. Fort Collins also stands out in particular for adeptly communicating its goals to the community in preparation for its 2050 target. The City of Aspen in Colorado has also made significant progress on its operational goal, currently at 40% reductions, which puts the city ahead of schedule for their 2020 goal.[97]

---

[93] "Brazilian State Becomes First in the Country to Set Carbon-Neutral Goal." April, 2016 www.wri.org/blog/2016/04/brazilian-state-becomes-first-country-set-carbon-neutral-goal

[94] "Austin on Track to Meet Carbon Neutral Goal, if City will Pay for it." Elizabeth Findell, March, 2018. American-Statesman. www.mystatesman.com/news/local/austin-track-meet-carbon-neutral-goal-city-will-pay-for/vAUAY3YGjwpB5Ppq581gmI/

[95] Lazarus, Erickson, Chandler. "Getting to Zero: A Pathway to a Carbon Neutral Seattle." SEI, May 2011 www.seattle.gov/Documents/Departments/OSE/CN_Seattle_Report_May_2011.pdf

[96] 2015, CAP Framework. City of Fort Collins https://www.fcgov.com/climateaction/reports.php and https://www.fcgov.com/climateaction/files/2017-inventory-what-has-changed-updated-05.01.2018.pdf

[97] "Greenhouse Gas Reductions | Aspen, CO." Accessed June 1, 2018. https://www.cityofaspen.com/564/Greenhouse-Gas-Reductions.

Copenhagen in Denmark, a city with a similar population size to Seattle's that is also growing quickly, has two communitywide goals. It prides itself on being one of Europe's greenest cities and its carbon neutral goals are an escalation of past efforts to decarbonize the city. Copenhagen's near-term goal is to be carbon net neutral by 2025, achieving just over half of these emission reductions through purchasing offsets.[98] Long-term it plans to become fossil-fuel free by 2050, a goal that it is studying for feasibility. By 2017 Copenhagen reduced its carbon emissions by more than 40% from its 1990 baseline, while its population has grown by 50%.[99] The City of Copenhagen's 2015 climate action plan contains goals within four areas: energy consumption (7% of reductions), energy production (74%), green mobility (11%) and city administration initiatives (2%). According to the City of Copenhagen's 2015 Climate Action Plan, the city's carbon emissions reductions are to a large extent due to expansions of its district heating grid which covers 98% of the demand for heating in Copenhagen. By cogenerating heat and power its energy use is almost twice as efficient. District heating has not only provided significant environmental benefits but has also provided more affordable heating to city residents. By 2025, power and heat generation in Copenhagen will primarily be based on wind, biomass, geothermal energy, and waste (shifting away from coal). The City has a goal to make district heating carbon neutral by 2025, and for the city to secure the generation of renewable surplus power.[100] These initiatives will require transformative infrastructural changes. It also focuses on promoting biking as a mode of transit to reduce emissions.

Other governments do not specifically have carbon neutral goals but instead have deep decarbonization or 80% reduction goals by 2050 and are making significant progress. As discussed earlier, this reduction goal is dictated by what the 2015 Paris Agreement states is necessary to avoid the worst effects of climate change. The City of Portland has adopted a communitywide 80x50 reduction goal and in 2000 its emissions peaked. As of 2014, total carbon emissions in Multnomah County were 21% below 1990 levels, compared to national emissions which are up 7% from 1990.[101] In this time, Portland has experienced a 33% population rise and its jobs increased by 24%. Also, since 1990 its transportation emissions have fallen 5%, reductions that are due to:

> King County has adopted an "80x50" goal for its communitywide emissions. The County operational goal must reach this level of emissions reductions or more, in order to set a strong example.

- Increasingly complete and connected neighborhoods
- Shifts from driving to walking, biking and transit vehicles that are more efficient

[98] Ibid.

[99] Berger, John J. "Copenhagen, Striving To Be Carbon-Neutral: Part 1, The Economic Payoffs." Huffington Post (blog), March 13, 2017. https://www.huffingtonpost.com/entry/copenhagen-striving-to-be-carbon-neutral-part-1-the_us_589ba337e4b061551b3e0737.

[100] "Copenhagen Climate Action Plan: The Short Version," 2015. https://www.energycommunity.org/documents/copenhagen.pdf.

[101] "City of Portland and Multnomah County: Climate Action Plan Progress Report." City of Portland, April 2017. https://www.portlandoregon.gov/bps/article/636700.

- Renewable fuel standards that have reduced the carbon intensity of transportation fuels[102]

5.2 Private Sector

Corporations are also setting carbon neutral goals, making individual and joint company commitments to reduce GHG emissions. This was especially true leading up to the United Nations Climate Change Conference in Paris in 2015. The U.S. White House's American Business Act on Climate Pledge obtained commitments from hundreds of companies who support the Paris Agreement, as has RE100 among other groups.[103]

Skanska, a Swedish project developer and contractor, strives to be an innovative leader within its industry and has a zero carbon goal by 2050 for its Swedish operations, which includes its supply chain.[104] Construction is a carbon-intensive industry, which provides the sector an opportunity, given its high level of control, for significant emission reductions. Since 2013 Skanska has conducted over 700 project carbon footprints, which estimates embodied emissions in order to identify reduction opportunities. Skanska also reports publicly on its scope 1 and scope 2 emissions while tracking and disclosing scope 3 emissions to the Carbon Disclosure Project.[105] Skanska works with suppliers to improve their green performance. To this end, it cofounded the United Kingdom's Supply Chain Sustainability School, a collaboration across the construction industry that gives suppliers practical and free support.[106]

Several companies have set and achieved carbon neutrality goals including Microsoft in 2012 and Google in 2007, while others continue to set new goals including Philips by 2020 and Johnson & Johnson by 2050. Many companies seeking operational carbon neutrality can afford to purchase offsets to become carbon net neutral in the near-term, as they drive their business practices to be more sustainable. For example, as of April 2018, the rideshare company Lyft has become one of the world's largest voluntary purchasers of carbon offsets. Effective early April, it will offset the carbon emissions from all rides globally. This is an ongoing commitment, so that any Lyft ride moving forward will be carbon net neutral. This is a multi-million dollar investment in the first year, and in year one it anticipates offsetting over 1 million $mtCO_2e$. The majority of these projects will be in close proximity to its largest markets, and all will be based

---

[102] Ibid
[103] HOME - RE100." Re100. Accessed March 7, 2018. http://there100.org/home.
[104] "Project Carbon Footprinting" (Skanska), accessed May, 2018 group.skanska.com/4a22a4/globalassets/sustainability/green/our-journey-to-deep-green/how-we-define-green/projectcarbonfootprinting.pdf.
[105] "Carbon," Skanska - Global corporate website, accessed May 10, 2018, https://group.skanska.com/sustainability/green/carbon/.
[106] Global Recognition for climate change leadership." October, 2016 https://group.skanska.com/media/articles/global-recognition-for-climate-change-leadership/

in the US. In the future, all of its vehicles will operate with clean energy, thus the company sees this as an interim step in reducing its emissions. [107]

In recent years, many companies are focused on purchasing renewable projects directly in order to green their energy supplies. Google for example consumes as much energy as the City of San Francisco, thus its impact is large. It claims that it is the world's largest purchaser of renewable energy facilities.[108] Google signs 15-20 year contracts for renewable energy facilities and retires its voluntary RECs to ensure their additionality, though not all companies have been so rigorous. Regardless, companies are quickly ramping up use of direct renewables to reduce operational emissions.

For example at Apple, 16% of its facilities were powered by renewable energy in 2010 and by 2016 that number had increased to 96%.[109] However the company has no explicit carbon neutral goal, instead focusing on its power source as the major emitter. Since its data centers use more power than any other business units, the company worked to get its data centers powered by 100% renewable energy, a goal it reached in 2014. In 2018 Apple finished getting the rest of its facilities running on 100% green power, including its new headquarters, distribution centers, and retail stores around the world.[110] Though this only covers Apple's own operations, it has also convinced 23 companies in its supply chain to sign a pledge to achieve 100% renewable energy for the pieces of their business related to Apple products. The company has often been a catalyst, working with local utilities to build new solar or wind farms for the grid.

Because Google and Amazon's businesses are more dependent on internet services than Apple's, they buy more energy than Apple does.[111] Amazon Web Services is working toward 100% green energy for its data centers and announced that it passed the 40% mark in 2016.[112] However, some question the transparency of companies like Amazon and whether they are doing as much as they claim.[113] Reasons that companies seek carbon neutrality include winning new business, enhancing credibility among current and prospective customers, engaging employees, and building a green reputation.[114]

---

[107] John Zimmer, "All Lyft Rides Are Now Carbon Neutral." April 19, 2018. https://medium.com/@johnzimmer/all-lyft-rides-are-now-carbon-neutral-55693af04f36.
[108] Umair Ifran, "Energy hog Google just bought enough renewables to power its operations for the year." December 2017 www.vox.com/energy-and-environment/2017/12/6/16734228/google-renewable-energy-wind-solar-2017
[109] Mark Sullivan, "Apple Now Runs On 100% Green Energy, And Here's How It Got There," Fast Company, April 9, 2018, www.fastcompany.com/40554151/how-apple-got-to-100-renewable-energy-the-right-way
[110] Ibid.
[111] Ibid
[112] AWS & Sustainability web page, accessed May, 2018: https://aws.amazon.com/about-aws/sustainability/#progress
[113] 350 Seattle, Accessed May, 2018: http://350seattle.org/amazon/
[114] "We're Set to Reach 100% Renewable Energy — and It's Just the Beginning." Google, December 6, 2016. https://blog.google/topics/environment/100-%-renewable-energy/.

5.3 Universities

Universities are moving forward to address climate change as well. Second Nature is a professional association and is the primary support for the American College and University Presidents' Climate Commitment.[115] Second Nature coordinates cooperative action in developing a carbon offset protocol for universities and coordinates outreach for new presidents to make a commitment to carbon neutrality. So far universities that have made firm commitments to carbon net neutrality include the University of California by 2025, Oregon State, Loyola University Chicago, and University of Florida all by 2025 (including its athletics program, in an effort to enhance awareness about carbon neutrality). Others carbon neutral commitments include Harvard by 2026 (and fossil fuel free by 2050), Arizona State University by 2035, and Cornell and University of Illinois by 2050.[116]

Harvard University representatives have expressed that by setting this goal they seek to broadly share what they learn.[117] Harvard is also closely collaborating with the cities of Cambridge and Boston on climate preparedness and planning efforts. Both cities have set goals to become carbon neutral by 2050 as part of a regional commitment announced in early 2018. A three-year, graduate-level course funded by the University is engaging students across its professional schools in developing realistic, quantifiable emissions reduction projects that will help organizations like Harvard achieve ambitious climate goals. The University of California set its goal in 2013 and seeks to achieve neutrality by 2025 with a three-step approach.[118] The first step is making its buildings and other facilities more efficient which could net $20 million in savings per year by 2025.[119] Next is pursuing more wholesale electricity management, more natural gas and biogas procurement, and finally phasing out natural gas altogether by electrifying everything.

[115] "Homepage." Second Nature. Accessed June 1, 2018. http://secondnature.org/.

[116] Ibid

[117] "Harvard Will Seek to Become Fossil Fuel-Free by 2050," accessed May 5, 2018, https://www.hks.harvard.edu/announcements/harvard-will-seek-become-fossil-fuel-free-2050.

[118] "President's Initiative: The First Research University to Achieve Carbon Neutrality." UCOP Business Operations. Accessed March 19, 2018. https://www.ucop.edu/sustainability/_files/carbon-neutrality2025.pdf.

[119] "New Report: How UC Can Meet Its Ambitious 2025 Carbon Neutrality Goal," Cal Alumni Association, April 23, 2018, https://alumni.berkeley.edu/california-magazine/just-in/2018-04-23/new-report-how-uc-can-meet-its-ambitious-2025-carbon.

Part 6: Evaluation of Policy Components against Criteria

This section evaluates each key question or policy component against our four criteria or King County priorities and pulls from the literature review and lessons learned from interviews. Key findings are listed at the bottom of each of these evaluation sections.

6.1 Question 1: How should carbon neutral be defined?

6.1.1 Climate Benefits

Climate experts encourage taking ambitious actions but advise making a nuanced claim with interim reduction goals, as opposed to one long-term carbon neutral goal. Other interviewees advised that the simpler the goal is, the more responsive leadership will be. Interviewees also encourage being realistic about the goal, ensuring that it is achievable while still being ambitious; they acknowledge that this is a difficult balance to get right when setting a goal. Many of those interviewed prefer to think of carbon neutrality as a framework over a stand-alone goal, as it is more holistic this way. It was also emphasized that population growth makes mitigation efforts and especially a carbon neutral goal more difficult. Population growth asks more of County services and produces more emissions across its operations, not to mention the impact on communitywide emissions. Decoupling these growth trends is viewed as the first step and must be considered in strategizing on what type of goal to set.

There was little consensus as to whether the term "carbon neutral" is beneficial in setting a goal. Some claimed that it helps "de-wonk" reduction goals, so that employees and the community can better understand it. Others expressed that it is a beneficial term in creating as opposed to reducing something, i.e., emissions. Others interviewed disagreed and feel that "carbon neutral" sounds passive. While there was skepticism about setting a carbon neutral goal, there was also acknowledgement that setting a goal can drive real climate benefits.

Next, engaging leadership and local partners is viewed as very important, particularly for an operational goal. Getting buy-in at the top must be a priority according to interviewees, in order to create a goal that is valued from the bottom up and top down. This is because a commitment to a goal is considered a political tool that has more value if leadership is onboard.

Absolute carbon neutral and fossil fuel free are strongest against this criteria, due to the transformative nature of these goals and their additional benefits. However, because they are less achievable, deep decarbonization, zero-emissions and 100% renewable goals may be wiser to set in the short term. These more achievable alternatives will better inspire employees and

policymakers to make meaningful carbon mitigation efforts. Finally, as Metro's 2017 feasibility study highlighted, the pursuit of a carbon net neutral goal would not achieve the County's SCAP commitment to directly reduce GHG emissions from the operation of its transit fleet or set it on a long-term path to reduce the region's emissions, nor would it reduce air pollution or public health inequities resulting from poor air quality. Thus, this goal may not be a good option in the near-term or long-term.

6.1.2 Feasibility

Interviewees highlighted that carbon neutrality is difficult to achieve even when the power source is virtually carbon free, as in the City of Seattle. In the near-term, deep decarbonization, is most feasible according to many, particularly when there is sufficient funding available to make direct reductions. With an absolute carbon neutral or fossil fuel free goal, eliminating all emissions will either be costly or very difficult to implement without purchasing offsets. Next, though feasible, a carbon net neutral goal has little political will behind it at the County for purchasing RECs or offsets. Long-term, all goal types become more feasible as technology improves and infrastructure is replaced for example. Goals also become more feasible if there is a clear, step by step plan for achieving it, which creates buy-in for employees and policymakers. This can be achieved via detailed planning documentation by department. But there are limits to what local regional government can do without a national or state carbon fee or tax or other national policies like the corporate average fuel economy (CAFE) standards for the tailpipe emissions of cars and light trucks for example.

Many program managers interviewed emphasized that shorter term goals that will make the immediate impact on emissions reductions and should be prioritized and planned out in detail. Because technology solutions will change in the future, long-term goals are more difficult to plan for. The City of Seattle is falling behind on its emissions reduction goals and is thus doubling down on its near-term goals to reduce core emissions 58% by 2030. In 2018, the City updated and refined its short-term reduction goals, especially its transit-related goals to try to get back on track (see Seattle case study in the Appendix). Copenhagen's ambitious, communitywide goal for 2025 demonstrates that setting a comprehensive and achievable near-term goal is important, as it has made great progress on this goal. It is also important to consider long-term goals, which provide more flexibility and may be easier to implement as technologies improve and infrastructure is replaced or updated. Copenhagen's long-term 2050 goal is an escalation of past efforts to green the city. The lesson is that setting achievable near-term goals serve as motivation to tackle more difficult, long-term goals.

6.1.3 Alignment with King County Strategic Plan

It is difficult to assess which goal types are best aligned with County priorities, as impacts on equity, level of service, and jobs will only be known once piloted or analyzed quantitatively. Various goal types have the potential to create more equity and social justice in the County by directly removing GHGs and pollution from low-income areas and/or deploying new bus service to these areas first. Some of these benefits will be local, for example with a fossil fuel free, zero-emissions, or direct emissions reduction goal. Benefits likely will be more global in terms of air pollution and green economy jobs with indirect emissions reductions or a carbon net neutral goal for example.

6.1.4 Community & Partner Engagement

A deep decarbonization goal is replicable if other jurisdictions have similar emission sources and similar services. It also has the capacity to build toward achieving the County's communitywide emission targets, however it is not always understood well by the public, as it can be quite nuanced with various reduction targets included. The public may perceive a fossil fuel free, zero-emissions or 100% renewable goal more favorably, as these goal types are perhaps more captivating and digestible to the general public. Many universities, especially the University of California (UC) and Harvard, view their carbon neutral or fossil fuel free goals as a way to be at the forefront, pushing them to be innovative and to lead. UC leadership has stated that it hopes others will follow its lead, that it will be a replicable model.[120]

6.1.5 Key Findings

The criteria presented in Part 3 provide guidance in analyzing the different goal types. These goal types are not mutually exclusive.

- **Climate Benefits** - A deep decarbonization goal is perhaps the most realistic and achievable and thus has the greatest climate benefits, namely by replacing two major sources of emissions at the same time - fleet and facility energy. This includes fleet emissions through the adoption of battery-powered buses and power source emissions through Green Direct.

- **Feasibility** - 100% renewable and deep decarbonization are likely most feasible, as they are relatively cost-effective goals, more straightforward to implement and more flexible than other goal types. Plus, in the short term, they are more easily controlled by County employees.

---

[120]"New Report: How UC Can Meet Its Ambitious 2025 Carbon Neutrality Goal," Cal Alumni Association, April, 2018, https://alumni.berkeley.edu/california-magazine/just-in/2018-04-23/new-report-how-uc-can-meet-its-ambitious-2025-carbon.

- **Alignment with King County Priorities** - Several goal types are aligned with County priorities, due to their ability to directly remove emissions from impacted communities and thus address equity concerns. Service and economic development impacts are difficult to assess by goal type, as much is still unknown, especially regarding risks or limitations to County services.

- **Community and Partner Engagement -** Deep decarbonization is replicable and has capacity to build toward achieving the County's communitywide emission targets. However, it is not always understood very well by the public, as it can be more nuanced.

6.2 Question 2: Where should the boundaries be drawn?

6.2.1 Climate Benefits

Setting the boundary for an operational goal as wide as possible creates a bigger umbrella for emission reduction projects and collaboration. However, if the boundary of the goal is set too broadly it may not gain traction. Many interviewed expressed that carbon neutrality is feasible immediately depending on where the boundary is drawn. For this reason it is important for a public entity to consider why they are setting a carbon neutral goal and ensure that it is reflected in the boundary. For example, counting emissions avoided by public ridership of the Metro fleet (a category of scope 3 emissions) as a real reduction, could help the County reach net zero-emissions. However, this method would not lead to organizational change or the real emission reductions necessary for addressing climate change, as is true of most scope 3 reduction inclusions.

Finding emission reduction opportunities that are accessible to County employees should be considered when selecting a boundary and scope 3 inclusions. Scopes 1 and scope 2 are tangible but may not be connected to the everyday choices of employees. Including materials from scope 3 like paper can challenge employees to engage directly with the emission reduction goals through day to day choices. For example, tracking scope 3 emissions by department may increase awareness of the impact of individual choices and department cultures. Some organizations interviewed went a step further to include a sustainability-based bonus system to incentivize emission reduction activities.

6.2.2 Feasibility

Accurate GHG inventories, especially of scope 3 which depends on information provided by external entities, can be expensive and labor-intensive. For example, DNRP's GHG inventory, which was verified as following best practices by external parties, is a labor-intensive exercise that could be especially burdensome for some County departments if each was required to

maintain its own inventory. Next, the indirect nature of scope 3 means that the County has limited control over the reduction of emissions in that category. For example, King County can change scope 1 emissions for the fleet by switching to electric buses and impact scope 2 by installing charging stations in areas that are powered by 100% renewable energy. However, King County will have more limited control over embodied emissions, including during large purchases like buses. The County can influence these scope 3 emissions within manufacturer provided material options or if there is competition between manufacturers by choosing lower carbon alternatives.

6.2.3 Alignment with King County Priorities

The choice to include more than scopes 1 and 2 emissions for an operational target can be heavily influenced by equity and social justice considerations. As the boundaries are drawn wider with more strategic inclusions of scope 3, there are greater opportunities for providing equity and social justice benefits, as well as more economic development opportunities within the County as more emissions must be addressed overall, ideally with innovative direct reductions. Further quantitative study is needed to determine what scope 3 emission inclusions might support other King County priorities.

6.2.4 Community and Partner Engagement

Expanding a boundary to include scope 3 in an operational boundary can contribute to communitywide reduction targets. The inclusion of contracted services is one example of how a local government can drive change within its community and provide leadership and incentives that support community emission goals. A primary takeaway revealed in interviews about scope 3 is to not to try and tackle it as "an island." A collaborative approach that works with other cities and counties to track scope 3 emissions and share lessons learned can create replicable solutions at a lower cost for all jurisdictions.

Collaboration is also important in relation to setting a boundary, since scope 3 emissions naturally involves other stakeholders. This is because the County's scope 3 emissions may be another organization's scope 1 and 2 emissions. A primary example of this are services that the County puts out for bid as a contracted service, for example waste hauling services provided by a private third party.

In British Columbia, a published guide recommends that local governments (who are voluntarily and publicly committed to carbon neutrality) include emissions from contracts that are new or up for renewal and worth over $25,000 annually. These contracts represent a service that would otherwise be provided by the government (e.g. waste haulers). The guide's five steps to including contracts are:

- Build employee awareness.
- Include inventories as a requirement during the request for proposals.
- Contractually require tracking and disclosure of emissions.

- Add contractors' emissions to the local government inventory.[121]

6.2.5 Key Findings

- **Climate Benefits:** Choices for drawing a boundary should prioritize driving organizational change and emission reductions, as opposed to selective inclusions of scope 3 emission reductions that make it easier to reach net zero-emissions. Strategic inclusions of scope 3 is one important way to actively engage employees in reduction efforts.

- **Feasibility:** Goal boundaries should be limited for feasibility to areas where the County has a strong level of influence or control and accuracy in the near-term. However, inventories can be more comprehensive and track all emissions and be refined for accuracy and longer term inclusion.

- **Alignment with King County Goals:** Scope 3 inclusions and reduction efforts may provide opportunities to address other objectives, such as equity and social justice, service levels, and job creation in implementation.

- **Community and Partner Engagement:** Including strategic scope 3 can support community emission reduction goals. For example, accounting for contracting emissions can incentivize private sector reductions. Making scope 3 expertise available to smaller jurisdictions may enable climate action replication.

6.3 Question 3: How to set a timeline for a carbon neutral goal?

6.3.1. Target Years | Climate Benefits

Near-term target years can create more employee engagement and accountability for elected officials. However, near-term targets can also lead to a focus on incremental reduction strategies by not allowing sufficient time for planning and implementation for transformative changes. Target years like 2050 may be too distant to be salient for employee and elected official engagement. The average years for a reduction goal in the ICLEI sample was just under 10 years out, which likely strikes a good balance between being imminent and allowing time for change. King County employee interviews revealed that most felt 2050 was too far out for a primary goal to catalyze the necessary organizational change for deep and meaningful emission reductions across operations. This tradeoff between feasibility and accountability is one reason many organizations establish short term goals that build to a more ambitious long-term goal.

---

[121] "Becoming Carbon Neutral: Guidance on Including Contracted Emissions in Local Government Corporate Inventories" (Judith Cullington & Associates, April 2012), http://www.toolkit.bc.ca/sites/default/files/CNLG_Contracted%20Emissions_April%202012%20_FINAL.pdf.

6.3.2 Target Years | Feasibility

Target years that are farther out allow for more time to allocate resources, for technology to be developed, and for strategic and comprehensive planning toward emission reductions. However, with long-term goals, entities risk planning instead of reducing, not internalizing the goal into active work plans. For example, the County Metro's study of transitioning to a zero-emission fleet estimated that it could transition to a zero-emission fleet as early as 2034 up to 2040. This means that King County Metro, a major portion of the county's emissions, will not be carbon neutral until 2034 at the earliest. Given regulations that Metro keep buses on route for at least 12 years (they currently average 14 years), it would be difficult if not impossible, even with budget allocation, to achieve an earlier target year.

6.3.3 Target Years | Alignment with King County Strategic Priorities

If target years are too ambitious they could require a significant reallocation of resources resulting in either a reduction in the quality of service or a failure to meet the goal. In Metro Vancouver a carbon neutral goal for operations was adopted by many local governments, but when the target year arrived most were not able to meet it. In order to still show commitment and progress towards a very publicly stated goal many local governments changed to carbon neutral in progress. Their goal was to move toward making carbon neutrality year over year, however in years where they fell short (all but one in 7 years) they would not consider offsetting. King County Metro explored the offset burden that could be required to make them carbon net neutral in the near-term and found that it would be equivalent in cost to 3,000 to 8,000 service hours annually, assuming $5-10 per ton for purchased offsets. The County as a public entity has an obligation to the community to balance climate action with other priorities, such as maintaining a high level of service.

The target year provides a particularly salient cross generational equity and social justice concerns for younger King County residents. Future generations are already going to be burdened with extensive costs related to climate change and pushing it farther into the future exacerbates this issue. Additionally, closer goals prioritize infrastructure changes that can help solve upstream equity issues.

6.3.4 Target Years | Community & Partner Engagement

The County's operational emission goals can and should support progress toward community emission reduction targets. For this reason consideration should be given to the connection when determining a consistent target year. This is especially true when considering scope 3 emissions for operations, as many of those will be within the community goal boundary. For community emissions some organizations interviewed used emissions per capita, which can be

particularly useful way to consider community emissions in a manner that may be more accessible to the general public.

The sooner King County emissions are reduced to neutral or another aggressive target the sooner they can provide leadership for other jurisdictions and businesses within their geographic boundary. Solutions will need to be changed on the unique operational units and resources available, however sharing lessons learned was considered critical to large scale success by many interviewed.

Target years are an important part of public perception and the balance is between a year that will be accessible to the public, but that the County can also be accountable to. For example, 2050 is far enough out it may risk the perception of adopting a goal of good intentions only; but a public goal of 2025 that does not get met could also provide pushback against King County's image as a leader in climate action. The tradeoffs between feasibility and accountability need to be carefully considered in setting goals.

More near-term target years require higher upfront financial investments, whereas longer term targets allow for a graduated investment over time. Additionally, aggressive near-term targets could require retiring equipment before the end of its useful resulting in higher overall expenditures overtime. The timeline must also provide motivation and accountability for committing sustained financial resources over time.

6.3.5 Baseline Years | Climate Benefits

Demonstrating accessible progress towards political commitments is ideal, however for baseline years interviews revealed a preference of the first accurate GHG inventory. The accuracy of the baseline was considered critical to demonstrating emission reduction progress. There is an ongoing shift towards the adoption of Science Based Targets, which explicitly focus on levels of reduction that are required to maximize the climate benefits needed on a timeline to avoid the worst impacts of climate change. This shifts the frame for accountability from the baseline year choice to the emission reduction level.

6.3.6 Baseline Years | Feasibility

Science Based Targets may have the highest level of climate benefits, however the feasibility for a public entity is likely to be lower. In general, Science Based Targets trade a commitment to feasibility for the ethical obligation for emission reductions necessary. Over 400 companies have set this type of target, but most also publicly admit when they accept the ambitious target that they do not know how to get there just yet. A Science Based Target is also delineated on an

individual entity and sector scale, and as of yet there is no public sector based guidelines. While some cities have tried to adopt this type of goal they were unable to get the traction necessary to make it become salient, as the goal was not accessible for many. The individual entity aspect of a Science Based Target could also require the expense of an outside contractor to analyze what a King County Science Based Target would be; that expense is an addition to the potential of the emission reduction target then being too expensive for a public entity to meet on such an aggressive timeline.

6.3.7 Baseline Years | Alignment with King County Strategic Priorities

From an equity and social justice perspective, especially for the global community, it would be most in line for King County to adopt a Science Based Target. The County is part of the industrialized world that is contributing heavily to the climate problem at great benefit and thus, many would argue, needs to bear the cost. This focus on the global community, however, could come at the expense of taxpayers and is something that the County would need to consider carefully. Taking the global consideration of equity and social justice may also distract a public entity from focusing on equity and social justice opportunities within their own jurisdiction. A more moderate reduction goal based on an accurate baseline year provides the opportunity to demonstrate how an ambitious goal can be executed without compromising other objectives.

6.3.8 Baseline Years | Community and Partner Engagement

While being accountable to a public commitment like Kyoto is ideal, interviews revealed a priority of an accurate inventory for the baseline year. Recreating an accurate 1990 baseline for an entity like King County that did not have a GHG inventory at the time would be very difficult, if not impossible.

It is important that efforts not be judged immediately as ineffective if there is no reduction from the baseline. The first step in showing progress is addressing drivers of emission growth to change the direction of the momentum from increasing to decreasing. In the case of operations this means decoupling emission growth from the expansion of services and the community. Only after that point can emissions begin reducing from recent years and then later on from the baseline.

6.3.9 Duration

When considering a carbon neutral goal it is critical to consider the resources needed in each period to ensure an accurate inventory, continued reduction activities allowing for forward progress, and the purchase of offsets. Heavy levels of offsetting can have a significant

opportunity cost year over year by preventing those funds from being used in direct reduction efforts or for other services. In British Columbia provincial operational units are required to pay a mandatory $25 offset per metric ton, which is in addition to the province wide $30 carbon tax. Some provincial operations receive the carbon tax back through an income tax break, however the publicly operated schools do not and must pay the full $55. Without resources to invest in direct emissions schools became committed to annual offsetting costs, without much hope of decreasing their offsetting burden overtime.

By contrast many local BC governments (like cities), who voluntarily committed to carbon neutral, track their progress year over year but claim "carbon neutral in progress." Metro Vancouver has been carbon neutral for one year due to a high emission reduction project, however in interviews stated that annual goal of carbon neutral helped to keep emission reduction efforts at the forefront. This version of the goal avoids the financial burden of a one year duration regarding offsets, but still requires a heavy investment to ensure that consistent data is available every year. For King County, it is critical in operations to consider the departmental burden of any implementation to ensure that it is achievable for all departments and that it fosters emission reductions continually over time.

6.3.10 Key Findings

Climate Benefits
- **Target Year:** Target years must be near enough to provide accountability and engage employees and elected officials, but distant enough to allow time for strategic planning.

- **Baseline Year:** The focus of a baseline years is accuracy while the reduction levels capture the level of ambition desired. This enables accurate tracking of emission reduction progress.

Feasibility
- **Target Year:** Distant target years are more feasible as they give more time for transformative changes to take place, however they also have the potential to encourage planning instead of taking direct actions and learning by doing.

- **Baseline Year:** The Science Based Target framework is valuable as it focuses on reductions over the baseline year, however it is not currently accessible to the public sector that has greater restrictions on how money is generated and spent.

Alignment with King County Strategic Goals

- **Target Year:** Target years must incentivize aggressive climate mitigation without compromising the quality of local community services through reallocating resources. The closer a target year is set, the more quickly equity and economic development benefits can be realized.

- **Baseline Year:** Focusing on a Science Based Target emphasizes equity and social justice at the global level as King County is part of the industrialized world. However, focusing on equity and social justice at a global scale could result in missed opportunities for the local community.

Community Partner and Engagement

- **Target Year:** Target years should be achievable as to avoid having to publicly redefine the goal and risk the appearance of a goal set only for good intentions; however, longer term goals run a similar risk by not as easily demonstrating accountability.

- **Baseline Year:** Being accountable to public commitments is ideal, however accuracy should be prioritized in choosing a baseline year. It is important to note that progress towards emission reductions starts with desynchronizing growth in emissions with driving factors such as growth in services. Only once that disruption occurs can progress from the baseline be shown.

Duration: The duration of a carbon neutral goal can have a substantive budgetary impact when requiring annual offset purchases. Understanding that a carbon neutral goal may be a moving target and tracking it as in-progress is an alternative practice enabling accountability to the framework while focusing resources on direct reductions.

6.4 Question 4: What direct reduction strategies should be prioritized?

Activities of interest that are evaluated here include energy efficiency measures, more renewable energy projects, a County-wide carbon fee, an analysis tool such as a shadow price of carbon, and an electric fleet.

6.4.1 Climate Benefits

Though this report focuses on a qualitative analysis, a quantitative analysis will be necessary to know what the climate benefit potential of various actions really are. This section consists

primarily of recommendations of what to analyze further in the quantitative phase of this effort and what to prioritize moving forward.

A zero-emissions transit fleet that is electrified and is powered by clean energy, has perhaps the greatest local reductions impact, is transformational, and arguably has the most additional benefits. But converting to an electric fleet for transit services is incremental and will take time as Metro retires and replaces its buses. Electrifying the transit fleet is a higher priority for the county than its single passenger vehicles because it has more impact in terms of emissions reductions.

Energy efficiency activities also have great opportunity for emission reductions, if pursued more aggressively in 2020 and beyond, particularly as new County buildings are constructed. If implemented well, energy efficiency activities may inspire employees contributing to these changes by using real time energy tracking so users see energy use for their building and how their actions influence use. There are also direct benefits as efficiency activities reduce County utility bills and thus provide more funding for other operational needs. Renewable energy projects also have major emissions reduction benefits and inspire employees.

Materials management's actual emissions reduction potential is currently minimal but may increase over time as this tool becomes more widely used and understood. But this goal area can also be a tool to inspire and engage employees and policymakers. For example, at the County, the Finance Business Operations department works to purchase green products, recycled paper, and to improve its procurement practices, purchasing environmentally-friendly products. This work engages employees directly in reductions. However, these accomplishments must be communicated broadly to all employees for there to be full buy-in and internal behavior change.

6.4.2 Feasibility

Some interviewees pointed out that prioritizing an electric transit fleet makes sense as these emissions are easily quantifiable and thus in the County's control. Also, an electric fleet may be more cost-effective in the long run, as combustion vehicles are expensive to maintain and some savings are realized long-term.

Carbon pricing makes direct reduction investments more cost effective as the full cost of emitting is accounted for, but direct reductions are still expensive. Adequate funding must be available to make transformative reductions possible. The City of Fort Collins, Colorado for example explained that it knows what its pathway is to reach its interim target for 2020, but it requires additional funding to reach its 20% reduction target. In 2020 the City plans to contract

75MW of wind power but is unsure if it will meet this goal due to funding issues. Thus additional employees or outside expertise may be needed to investigate new financing approaches that can bring actions called for in its CAP to scale. This may involve piloting a public private partnership for Fort Collins to leverage outside financing.

The literature review noted that a carbon pricing structure can be implemented in isolation or used in conjunction with another pricing tool. Microsoft is leading its emission mitigation efforts with a carbon fee, a successful example of integrating a cost of carbon into its operations. The carbon fee helps keep individual and departmental contributions to emission reduction goals at the forefront of the company's day to day choices. Additionally, the money from a carbon fee provides financing for future direct emission reduction projects. To be fully effective it is paramount that the money from the fee be reinvested in emission reduction efforts to create a revolving door fund for more emission reductions.

While a carbon fee can help address day-to-day decisions, a shadow price is feasible to use when making large decisions related to infrastructure or other purchases with heavy levels of embodied carbon. For example, Metro Vancouver adopted a shadow price set at the social cost of carbon ($150/ton) for analysis within large infrastructure projects. This decision framework is a change from business as usual and tends to lead toward cost reasonableness over cost effectiveness. It places a number value on the climate benefits of a project, which may result in choosing a more expensive option that is still reasonable, if not the cheapest. While carbon pricing may be complex to implement upfront, once established as a norm it requires little maintenance can make direct reductions more obvious and cost-effective.

6.4.3 Alignment with King County Priorities

Some interviewees addressed the importance of finding opportunities to move multiple policy agendas at once. For example, concerted efforts should be made to address transit-oriented development which both allows more people to take transit while also reducing emissions and improves availability of housing. Ultimately, this criteria is difficult to use in assessing direct reduction priorities without further quantitative analysis. Direct reduction efforts should be analyzed quantitatively and implemented to meet multiple priorities. Pilot projects can help test what the impacts are related to jobs, service levels and equity. For example, a zero-emissions fleet that prioritizes low income neighborhoods helps to address climate goals while also addressing pollution and its related equity and social justice concerns. A comprehensive quantitative analysis should be performed before making major infrastructure changes, as jobs are lost as well as created during these transitions and service levels and equity and social justice will vary by activity and how it is implemented.

6.4.4 Community & Partner Engagement

A zero-emissions transit fleet, although expensive in the short term, would likely be financially responsible long-term, especially when taking into account the shadow price of carbon, excluding embodied emissions at this time. The electric fleet would be viewed favorably by the community and may inspire more community members to take public transportation. Energy efficiency and renewable projects have similar community engagement benefits, slowly building toward communitywide emission targets.

Interviewees advised that to be a leader, governments must incentivize and encourage local businesses and the community to cut emissions. Because corporations can be a major driver in reducing communitywide emissions, the County should enable and continue encouraging innovative companies to reduce emissions through the incentives at their disposal. Those interviewed emphasized that partnerships are important to driving down emissions, even potentially adversarial partners. The City of Aspen in Colorado, a relatively small city, emphasized that it is important to have a good relationship with utility leadership. Aspen advises involving utilities in climate action planning meetings, because having a diverse set of community stakeholders can get utilities onboard with changes coming, allowing them to see that they are not alone in making difficult changes. Next, the City of Aspen works with local partners to green its entire fuel mix, not just its own operations. The County may want to consider working with PSE to green its fuel mix beyond the Green Direct program, to begin addressing communitywide emission targets. Others noted that local or regional efforts can act as laboratory for state and national action, proving that something works here and then being adopted at wider scale. Pushing ahead at the County level may have long-term benefits at the state level if successful here.

6.4.5 Key Findings

These reduction activities are not exhaustive or mutually exclusive and are primarily recommendations for the quantitative analysis phase of this project.

- **Climate Benefits:** A zero-emissions transit fleet that is electrified and powered by clean energy may have the greatest reductions impact, is transformational and arguably has the most additional benefits. Energy efficiency also has great opportunity for emission reductions, if pursued more aggressively in 2020 and beyond.

- **Feasibility**: Putting an internal carbon fee and shadow price into place is feasible and makes other direct reductions more cost effective by reallocating resources or changing the abatement cost curve respectively. More ambitious energy efficiency activities are

also feasible, as they are within the County's control and cost effective, particularly over the long-term.

- **Alignment with County Priorities**: A quantitative analysis is needed in order to evaluate how direct reduction activities rate against this criteria. Priorities for direct action should be energy efficiency, a zero-emission fleet, 100% renewable energy, a shadow cost of carbon and a carbon fee that provide local economic development, better services and equity benefits.

- **Community and Partner Engagement:** A zero-emissions transit fleet has the power to engage the community and partners and would help achieve community emissions targets if it helps get more individuals out of their cars or keep them from purchasing one. Once piloted at the County, this could be replicated elsewhere and be perceived favorably by the public.

6.5 Question 5: What indirect emission reductions should be included?

6.5.1 Climate Benefits

Of the indirect emission strategies available, offsets offer the greatest and most transparent climate benefits, especially for emission reductions. The offset requirement for additionality helps to ensure that without the financial investment in an offset project, a tangible emission reduction would not occur.[122] However, verification of offsetting projects is arduous and many projects originally assumed to be additional fall short during an independent verification or audit. The emphasis on verification also limits investment to projects where emissions can be readily quantified, which may not be those with the greatest climate benefits. By contrast, the primary benefit of RECs is to provide a market incentive for the growth of renewable energy, which while useful, is difficult to link to distinct climate benefits. Offsets are by definition meant to be a bridge, an incremental step in reducing emissions. As a result, indirect emission reduction strategies have minimal impact on creating transformative change within an organization.

---

[122] "Strategic Climate Action Plan: November 2015." King County, November 2015.
https://your.kingcounty.gov/dnrp/climate/documents/2015_King_County_SCAP-Full_Plan.pdf.

6.5.2 Feasibility

Many organizations with carbon net neutral goals in both the private and public sector rely heavily on offsets to make their goal feasible.[123] However, interviews revealed that offsetting was not easy to implement, as it requires significant due diligence to ensure additionality. Seattle City Light has one full time employee expressly for the purpose of managing their indirect emission portfolio. Furthermore, the market for indirect offsets may change in the coming years and become less accessible, especially locally to the extent they exist, if regulation occurs. If offsets are considered, interviewees recommended that they be within the forestry, agriculture, and waste sectors, as they are less likely to be vulnerable to more stringent compliance from regulation.

Concerns also arose about the level of financial investment required to address County operational emissions with indirect reductions, which could divert funds from other activities. In 2017 King County Metro analyzed the option of using offsets as a means of making its fleet carbon net neutral. Metro found they would need to offset over 135,000 tons annually, which would cost between $445,000 and $1.2 million for Metro alone.[124] Some public organizations that are committed to carbon neutrality are explicit that offsets will not be considered because they lack the financial resources to both offset and invest in direct emission strategies each year.

6.5.3 Alignment with King County Priorities

The purchase of indirect emissions carries a high opportunity cost, as funds are reallocated from other King County priorities such as service improvements and maintenance. For example, the $445,000 to $1.2 million that would be required to offset Metro emissions each year is equivalent to 3,000-8,000 service hours that could be used directly to improve fleet services. As a result, offset investments are likely to struggle to further other King County priorities like local economic development, service maintenance, or impacting local equity and social justice concerns. From the global perspective, offsetting can be viewed as an investment in addressing the inequity of climate change by investing in those least responsible and most harmed across the globe.

6.5.4 Community and Partner Engagement

While indirect emission reductions are commonly used by organizations looking to achieve a carbon net neutral goal, many of those interviewed advised considering potential public

---

[123] "10 Years of Carbon Neutrality." Google, September, 2017. https://static.googleusercontent.com/media/environment.google/en//pdf/10-years-carbon-neutrality.pdf.
[124] "Feasibility of Achieving a Carbon-Neutral or Zero-Emission Fleet" (King County Metro Transit, March 2017), https://kingcounty.gov/~/media/elected/executive/constantine/news/documents/Zero_Emission_Fleet.ashx?la=en.

perception ramifications. For example, in 2013, two years into the program, the Auditor General of British Columbia reviewed the operational carbon neutrality of BC governments and concluded that it was in fact not carbon neutral. Two major projects accounted for 70% of their purchased offsets and failed to meet an additionality review; the projects would have happened without the government's investment. Furthermore, the two projects reallocated public dollars, primarily from resource-limited schools, to private companies' projects (see British Columbia case study in the Appendix for more information).[125]

The auditor's report and subsequent public pressure resulted in the termination of the Pacific Carbon Trust, the original offset program.[126] In 2012 the Carbon Neutral Capital Program replaced the Trust as an offsetting mechanism that invests in school energy efficiency projects.[127] This demonstrates the importance of considering how the public will react to investment both in offsets as a concept, but also in the choice of offsets and the forgone opportunity to invest in other programs. It was also recommended that if considering offsets, it is wise to coordinate early on with an auditing branch of the government to determine the appropriate criteria for offsetting activities. As a public entity the County must seriously consider the optics of investing local taxpayer dollars into projects that fall outside its jurisdiction and the consequences if offset projects are found not to be additional.

6.5.5 Key Findings

Indirect reductions should be thought of in the context of county operations and their impacts to tangible emissions reductions and community service provision.

- **Climate Benefits:** The climate mitigation benefits of indirect emission reduction strategies are difficult to quantify and even harder to verify as "additional." Indirect strategies act as a transitional bridge solution, but as a result do not actively support transformative or organizational change.

- **Feasibility:** Indirect strategies make carbon neutral goals more feasible, however they require high levels of due diligence to do so in a credible manner. Entering into a carbon neutral offsetting cycle can also require a large and ongoing financial commitment.

[125] Doyle, Joyce. "AN AUDIT OF CARBON NEUTRAL GOVERNMENT." Audit. Office of the Auditor General of British Columbia, March 2013. https://www.bcauditor.com/sites/default/files/publications/2013/report_14/report/OAG%20Carbon%20Neutral.pdf.
[126] Apr 14, Kazi Stastna · CBC News · Posted:, 2015 3:30 PM ET | Last Updated: April 15, and 2015. "How Canada's Provinces Are Tackling Greenhouse Gas Emissions | CBC News." CBC, April 14, 2015. http://www.cbc.ca/news/canada/how-canada-s-provinces-are-tackling-greenhouse-gas-emissions-1.3030535.
[127] "Helping Local Governments Understand How to Be Carbon Neutral in Their Corporate Operations." The Workbook. Union of British Columbia Municipalities, March 9, 2012. http://www.toolkit.bc.ca/sites/default/files/CarbonNeutralWorkbook.V2_noapdcs_03.12_0.pdf.

- **Alignment with King County Priorities:** Investing in indirect strategies typically requires reallocating financial resources away from other core services or programs While indirect strategies can have global equity benefits in addressing climate change, they are less likely to enhance equity and social justice or other priority areas within King County.

- **Community and Partner Engagement:** As a public entity, the County should be cautious of investing in indirect reduction or offset projects as there is potential for poor public perception, offset benefits are outside the tax base, and because they have little capacity to build toward achieving communitywide reduction targets.

Part 7: Recommendation

The current goals for King County operations include a 25% reduction by 2020 and 50% by 2030 from a 2007 baseline. The County did not achieve its 2015 operational target, which was a 15% reduction by 2015, instead achieving a 1% reduction from its baseline year while accounting for scopes 1 and scope 2 only. While the building and facility emissions had dropped 16.5% compared to the 2007 baseline, fleet-related emissions remained relatively unchanged. This level of progress may in part be due to the limited time between the date when the goal was set and the initial target year as well as the need to first decouple operational emissions from growth factors like population and service levels. This context was considered in developing this near and long-term recommendation: an accountable and feasible reduction goal in the near-term and a transformative and ambitious absolute carbon neutral goal in the long-term. Our recommendation is explained below and outlined in Table 6 on page 73.

Question 1: How should carbon neutral be defined?

We recommend a more ambitious carbon reduction goal such as 80% in the near-term. A reduction goal is consistent with the operational goals established in the SCAP and would be in addition to any pre-existing SCAP goals. The exact reduction level or percentage must be determined in a quantitative analysis. A reduction goal prioritizes feasibility and a transparent demonstration of progress to employees and the community.

In the long-term we recommend shifting to an absolute carbon neutral framework. This allows the County to scale its level of ambition for climate benefits, by reducing all emissions and setting an operational example for the community at large.

Question 2: Where should the boundaries be drawn?

We recommend exclusively including scopes 1 and 2 in the near-term <u>goal</u> boundary. Maintaining this narrow boundary for the goal in the near-term is consistent with a focus on feasibility and accountability. Simultaneously, we recommend that King County maintain its holistic <u>inventory</u> and explore best practices for tracking and reducing scope 3 emissions for potential inclusion in the future.

Long-term we recommend strategically including scope 3 emission categories inside the goal boundary. Lessons learned from inventory efforts and further quantitative data analysis can serve as a guide as to which emissions can best be included within the goal. Scope 3 categories must be further analyzed for their ability to meet other King County priorities such as:

- Engaging King County employees in emission reduction efforts (e.g. business travel)
- Reducing communitywide emissions (e.g. contracting emissions)

- Enhancing equity and social justice benefits
- Fostering local economic development

The shift to an absolute carbon neutral goal over the long-term, allows the County to scale its ambition with a progressively more inclusive scope 3 emissions boundary. Due to indirect control over scope 3 emissions, the County will be able to influence but not completely mitigate many scope 3 categories they choose to include. Thus we recommend including scope 3 emissions or reduction only if their inclusion creates organizational change and measurable additional emission reductions.

Question 3: How to set a timeline for a carbon neutral goal?

We recommend a target year of 2035 in the near-term, as it balances feasibility constraints with accountability. Roughly 2/3 of the County's operational emissions come from its Metro fleet. Its feasibility study estimated that the earliest year for full implementation of a zero-emission fleet is 2034. Thus a 2035 target year allows time for planning to address other major emission sources such as the Cedar Hills Landfill, and alternatives for managing waste. We recommend that the baseline year for the reduction goal continue to be 2007 for consistency with current SCAP goals and for inventory accuracy.

The long-term target year that we recommend is 2050 with an annual commitment for carbon neutrality starting in that year. This allows for the inclusion of scope 3 emissions once best practices are more readily available and once King County's own ability to impact these emission levels is better quantified and understood. Where a 2035 GHG reduction goal focuses on inventory accuracy and feasibility, the long-term 2050 goal would create a transformative climate mitigation plan and the elimination of all operational emissions.

Question 4: What direct emission reduction strategies should be prioritized?

To reach a more ambitious reduction goal by 2035, the County will need to shift its organizational culture to systematically consider emissions in day-to-day decisions by using a carbon fee. The universal application of a carbon fee across all departments would ingrain in employees the responsibility to reduce emissions and help the County achieve its reduction goals. A carbon fee integrates climate mitigation into the County's bottom line and we recommend ensuring that the funds raised are reinvested into direct reductions activities consistently over time. Examples of direct reduction activities to prioritize and analyze in the upcoming quantitative analysis include:

- Increased energy efficiency for new buildings in particular, as well as retrofits
- Zero-emission or electric fleet
- A renewable energy source for the County's fleet and facilities

- Net Zero Buildings and Living Building Challenge for new infrastructure
- Large-scale carbon removal projects

In addition to a carbon fee, we also recommend applying a shadow price of carbon when making major County decisions, particularly infrastructure-related decisions. Using a shadow price has the potential to create dramatic emission reductions by potentially selecting projects that are more expensive but create more transformative change. However, these reductions may begin outside the goal boundary and the inventory due to the inherent difficulty in quantifying avoided emissions.

Question 5: What indirect emission reductions should be included?

We recommend excluding any indirect emission strategies from the County's goal, because of their potential to shift focus and resources away from direct emission reduction efforts. In short, they are not transformative and provide only an interim solution. The gradual inclusion of scope 3 emissions in the long-term is designed to help transition organizational culture, drive progress in community emission targets, and increase opportunities for climate action to align with County priorities like equity and social justice. The financial burden of purchasing offsets creates a conflicting incentive to keep the boundary narrow, as the County will have limited ability to completely neutralize these scope 3 emissions. The gradual inclusion of scope 3 should be prioritized over allocating resources for offsets, as this will have more transformative climate benefits and will support communitywide emission targets.

Table 6: Recommendation for King County Carbon Neutral Goal: There are 5 key questions for King County to consider in defining a carbon neutral goal. Recommendation and rationale for near- and long-term goal was based on: 1) Assessment against four criteria objectives: climate benefits, feasibility, alignment with King County priorities, and community and partner engagement; and 2) lessons learned from in depth case studies and over two dozen interviews conducted in with climate experts, and staff from government, university and private sector organizations.

	Recommendation	Rationale	Example
Question 1 How should a carbon neutral goal be defined?	**Near-term:** Ambitious GHG reduction, such as 80% **Long-term:** Absolute Carbon Neutrality	1. Near-term goal builds on current SCAP goals, increasing its reduction ambitions. Selected as it is **feasible** and promotes **accountability.** 2. Long-term goal is based on what science calls for in terms of **climate benefits** and can support **community emission targets.** But the specific goal type selected must be studied further.	**City of Fort Collins**, Colorado has made significant reductions leading up to its 20% by 2020 and 80% by 2030 reduction targets. As of 2017, the city achieved a 17% reduction in emissions from 2005. It also has a long-term 2050 carbon neutral goal that was set in 2014.
Question 2 Where should the boundaries be drawn?	**Near-term:** Scopes 1 and 2; inventory scope 3 **Long-term:** Scopes 1 and 2; strategic Scope 3 inclusion	● Scopes 1 and 2 selected for accurate data, direct **control**, and **accountability.** ● Scope 3 emissions are difficult to quantify and control and must be studied further. Long-term Scope 3 reductions support **community emission targets** and employee **engagement.**	**Harvard and Yale University**: Inclusion of scopes 1 and 2 only in goal; tracking Scope 3 in inventory. **Metro Vancouver**: Includes contracting emissions in Scope 3 as new contracts are signed to require contractors to inventory and reduce their own Scope 1 and 2 emissions.
Question 3 How to set a timeline for a carbon neutral goal?	**Near-term:** 2035 target year; 2007 Baseline **Long-term:** 2050 target year; Annual Duration	● Near-term provides **accountability** and driv**e** but allows time for **implementation.** ● Long-term provides an **engaging** framework and **feasibility** to expand the boundary.	The **Carbon Neutral Cities Alliance (CNCA)** is a collaboration of leading cities committed to aggressive reductions by a 2050 target year to provide a unified voice for policy change driving deep reductions and transformative change.
Question 4 What direct emission reduction strategies should be prioritized?	● Energy efficiency ● Electric transit fleet ● Renewable electricity ● Internal Carbon Fee ● Social Cost of Carbon	● A zero-emission fleet, 100% renewable electricity, and energy efficiency being implemented and may be achieved by 2035. ● A carbon fee makes direct emission reductions more cost-effective, create funds to reinvest, and further engages employees in mitigation. ● A shadow price of carbon engages decision makers by monetizing climate benefits, like emission reductions, during financial analysis of large projects.	**Metro Vancouver:** A social cost of carbon is used for infrastructure projects to favor a 'cost reasonable' solution with high emission reductions over simply the lowest cost option. **Microsoft:** "What makes the carbon fee truly pivotal for our environmental work is the combination of the accountability driven by the price signal and the earmarking of the collected funds for environmental initiatives."
Question 5 What indirect emission reductions should be considered?	**Near-term:** Exclude **Long-term:** Exclude	● Potential public perception and financial stewardship concerns (i.e. use of tax dollars). ● Little alignment with King County priorities, especially local equity and social justice.	**City of Austin,** Texas will buy several hundred thousand dollars of offsets to hit its 2020 carbon net neutral goal, but many organizations including BC have been criticized for offset use.

Appendix: Case Studies

Carbon Neutral Cities Alliance (CNCA)

Cities account for ¾ of the GHG emissions worldwide and house the majority of the world's population. Cities will play an important role in reducing operational carbon emissions, partially because they have the power to decrease per capita emissions through infrastructure changes that reduce the individual emissions of community members as well. Cities have the "power to act" in decreasing levels of authority in: facilities and areas they own and operate, where they set and enforce policies, where they have budgetary and revenue control, and where they can set a vision. For cities to make the largest impact they need to focus on integrating climate rational throughout policies and departments.[128]

The CNCA goal is for every member city to reduce their GHG emissions within their boundaries by 80% or more by the year 2050 (communitywide emissions). This represents the most aggressive city targets worldwide. Member cities are carbon intensive and by demonstrating both leadership and success they can encourage other cities of all sizes to take action. This goal of this initiative is to instigate "transformative" change redesigning core city systems (electricity, transportation, buildings, and waste management) so that they operate with few to no carbon emissions within twenty to thirty years. To conceptualize targets some member cities utilize a "carbon budget", which uses emissions per capita to determine what each individual within the boundary must emit for the city to reach their goal.[129]

Many cities are making progress and have various types of plans in place, however none currently have a plan that enables them to meet the full 80x50 goal. The process is growing stronger as cities share information and goals across borders while meeting their short-term goals.[130] The CNCA also created an innovation fund that has contributed $1.7 million to 17 early-stage projects to invest in new and innovative city-led strategies to test, develop, implement, and amplify deep carbonization strategies and practices.[131]

---

[128] "CNCA: Framework for Long-Term Deep Carbon Reduction Planning." Copenhagen: Innovation Network for Communities, June 2014. www.usdn.org/uploads/cms/documents/cnca-framework-12-2-15.pdf?source=http%3a%2f%2fusdn.org%2fuploads%2fcms%2fdocuments%2fcnca-framework-12-2-15.pdf.

[129] Ibid.

[130] Ibid.

[131]"Carbon Neutral Cities Alliance (CNCA) Innovation Fund: 2016 Annual Report." Annual. Carbon Neutral Cities Alliance Innovation Fund, 2016. www.usdn.org/uploads/cms/documents/cnca_innovation_fund_2016_annual_report.pdf.

City of Seattle

The City of Seattle (the City) was one of the first cities in the nation to adopt a climate action plan (CAP) in 2006. Its 2014 inventory shows that total emissions have decreased 6% since 2008 and per capita emissions have decreased 17%.[132] However, though its per resident emissions are falling, it is behind in overall emissions reductions in part due to rising population in the region. Seattle is still emitting roughly as much carbon as it did in 1990.[133]

In April, 2018, the City submitted an update of the key near-term actions needed to get back on track with its long-term carbon neutral goal.[134] It acknowledges that these actions alone will not be sufficient to meet its targets, but are the essential next steps that will allow it to make substantial progress and lay the foundation for continued progress. This includes for example the Mayor's directive to the Office of Sustainability & Environment to work with departments to define the types of projects to assess, the assessment method, and how to account for the broader costs of carbon, by October 2018. It also includes a map of optimal distribution of charging infrastructure which it will release in 2018, among other specific activities to take place.

A "Pathway to Carbon Neutral Seattle" report from 2011 guided the City's carbon neutral goal considerations.[135] This report suggests that actions taken in Seattle can lead to a roughly 90 % drop in GHG emissions by 2050, compared to 2008 levels. This leaves 10 % of emissions that must be addressed with offsets, sequestration and/or selling excess hydro-electricity for example.

In 2011 the City adopted by resolution a goal to be carbon neutral by 2050 and is now working to implement and reach this goal, to "reach zero net GHG emissions by 2050."[136] The 2013 CAP includes this carbon neutral goal and also calls for an interim goal of reducing core emissions by 58% by 2030 from a base year of 2008.[137] Its goals are divided into short and long-term goals, "by 2015 actions" and "by 2030 actions," with a lead agency for each. The City has traditionally focused on specific projects or initiatives, such as its Drive Clean initiative which is focused on

---

[132] 2014 Seattle Community Greenhouse Gas Emissions Inventory, August 2016.
[133] Erickson, Peter, Adrian Down, and Derik Broekhoff. "Seattle Climate Action Plan: 2014 Seattle Community Greenhouse Gas Emissions Inventory." Inventory. Stockholm Environmental Institute - U.S., August 2016. http://www.seattle.gov/Documents/Departments/OSE/2014GHG%20inventorySept2016.pdf.
[134] Hightower, Kamaria. "Mayor Durkan Announces New Bold Actions to Reduce Emissions from Transportation and Buildings," April 4, 2018. http://durkan.seattle.gov/2018/04/mayor-durkan-announces-new-bold-actions-to-reduce-emissions-from-transportation-and-buildings/.
[135] Lazarus, Erickson. "Getting to Zero: A Pathway to a Carbon Neutral Seattle," May 2011.
[136] "Seattle City Council Resolution Index," Resolution Number: 31312, accessed March 18, 2018, http://clerk.seattle.gov/~scripts/nph-brs.exe?s1=&s3=31312&s2=&s4=&Sect4=AND&l=20&Sect2=THESON&Sect3=PLURON&Sect5=RESNY&Sect6=HITOFF&d=RESF&p=1&u=%2F~public%2Fresny.htm&r=1&f=G
[137] "Seattle CAP, 2013," n.d., www.seattle.gov/Documents/Departments/Environment/ClimateChange/2013_CAP_20130612.pdf. page 8

installing fast chargers for electric vehicles, Move Seattle and Building Tune-Ups. Its 2013 CAP targets include:

- Road transportation & land use –82% emission reductions by 2030
- Building energy – 39% emission reductions reduction by 2030
- Waste - 70% Diversion Rate by 2022 & 50% methane emission reductions by 2020

Transportation-related emission reductions are particularly far behind, while buildings which account for roughly one third of the City's carbon emissions, are falling as quickly as the CAP calls for. In fact, the City has one of the most efficient building codes in the country. Achieving Seattle's transportation and building energy emission reduction goals will require reductions that average 4.5% per year between 2008 and 2030; for comparison, between 2008 and 2014, its actual pace averaged 1.3% per year. The city must increase the rate of emissions reductions, especially for road transportation emissions, as do many other cities with similarly ambitious goals. Passenger transportation emissions declined an average of 0.5% per year since 2008. To achieve its 2030 goal of reducing passenger transportation emissions 82%, Seattle needs to reduce emissions from passenger vehicles an average of 7.5% each year.

In its CAP, the City focuses primarily on emissions sources where local government has the greatest influence, including transportation, land use, building energy and waste. It supports the community's mitigation efforts with recommendations and considers emissions other than carbon dioxide such as methane and nitrous oxide, which have major health ramifications, among other impacts.

Seattle City Light

The City of Seattle's electric utility has been carbon neutral since 2005, in part thanks to its heavy long-term reliance on hydropower.[138] Seattle City Light (SCL) performs a verified inventory each year and seeks to be carbon neutral on an annual basis. It includes scope 3 emissions as much as possible, everything they can reasonably quantify such as employee air or rail travel and its meter readers' personal vehicle mileage (business travel in general). Its energy mix includes almost 90% hydropower, approximately 50% of which is supplied by projects owned and operated by the utility. This electricity supplies some of County operations' services with power.

---

[138] Stiffler, Lisa. "No Global Warming at City Light," November 9, 2005. https://www.seattlepi.com/local/article/No-global-warming-at-City-Light-1187133.php.

Over the years SCL's carbon emissions have dropped further due to its strong energy efficiency and conservation programs. Renewable energy projects have also been added to the utility's resource mix, including wind, landfill methane, and wood biomass energy. In 2016 the utility adopted its new integrated resource plan that relies only on renewable projects and energy efficiency to meet future load growth.[139]

Also in 2016, the City Council passed a resolution that opposes the use of fossil fuels and new nuclear energy in generating its electricity, which implies long-term the utility may need more carbon-free resources if it drops the 5% nuclear from its power mix.[140] Currently its largest GHG emissions source comes from market purchases of power, both directly by SCL and through the Bonneville Power Administration. Other
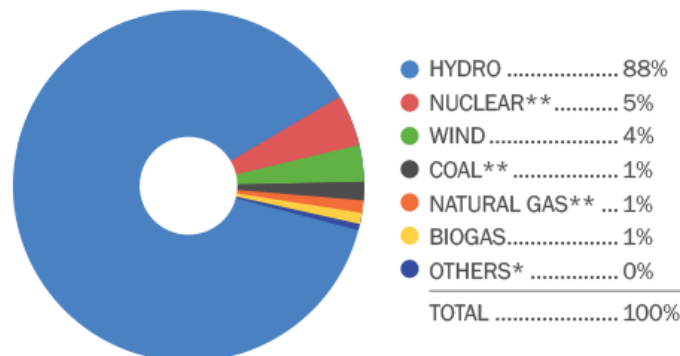

Figure 7: Seattle City Light fuel mix.

sources include fossil fuels used in utility vehicles and equipment, emissions from employees' air travel and natural gas used for building/water heat, and fuel in emergency generators.

According to its latest inventory released in August 2016, SCL purchases offsets for any remaining GHG emissions. All offsets are registered through the voluntary offset program the Climate Action Reserve, a third-party organization that qualifying and verifies its offsets. Each year the utility offsets between 100,000 and 300,000 $mtCO_2e$ of emissions, depending on how much it relies on market power purchases in any given year.[141] Projects the utility has purchased from include biodiesel fuel supply for Seattle area busses, ferries and garbage trucks; shore power for cruise ships at the Port of Seattle; aerobic composting of local food and yard waste; and methane recapture at dairy farms and landfills. Finally, it purchases a small number of compliance RECs to fulfill the state's RPS requirements as well as some voluntary RECs for its residential GreenUp program. To this end, in 2011 SCL purchased 22 megawatts (MW) worth of compliance RECs from the Sawtooth Wind Project in Idaho that will be generated between 2015 and 2029.[142]

[139] "Seattle City Light | Integrated Resource Plan." Accessed March 18, 2018. http://www.seattle.gov/light/IRP/default.asp.

[140] Cary, Annette. "Seattle City Council Passes Resolution Opposing Nuclear Power." Tri-City Herald, June 1, 2016. http://www.tri-cityherald.com/news/local/article81274437.html.

[141] "The Nation's Greenest Utility." Accessed March 18, 2018. http://www.seattle.gov/light/greenest/cleanhydro.asp.

[142] Tradition. "Tradition Brokers 20-Year REC Off-Take from Idaho Wind Project With Seattle City Light and 3Degrees." April, 2011. prnewswire.com/news-releases/tradition-brokers-20-year-rec-off-take-from-idaho-wind-project-with-seattle-city-light-and-3degrees-119691599.html.

British Columbia

Carbon neutrality in British Columbia (BC) is a means to providing climate action, leadership, and accountability. Their year over year carbon neutral goal is designed to create systematic change throughout the organization, shifting to a culture that minimizes emissions, through both organizational and individual choices.[143]

Operational carbon neutrality in BC includes a five-step cyclical process: measure, reduce, offset, report, and verify. Governmental entities must report annually and self-certify to ensure that they have accurate accounting for emissions. The information must then also be archived for future consultation.[144] Starting in 2011, governmental operations of select entities were audited by a third party, and since then 36 audits have been conducted with no major issues related to accuracy.[145] This auditing verification is separate from the formal government wide audit discussed below of the offsetting program.

Of 190 BC communities, 187 municipalities of varying sizes committed to operational carbon neutrality by signing onto the British Columbia Climate Action Charter.[146] The first BC government achieved operational carbon neutrality in 2011[147] and by 2015, 54 or 31% of reporting governments claimed operational carbon neutrality. The total 2015 reduction was estimated at 142,991 $mtCO_2e$, or approximately 60% of their collective operational carbon footprint.[148] BC governmental operations have been carbon neutral since 2010. Its operational emissions have decreased almost 1% since 2015 and almost 10% since 2011 when carbon neutrality was first achieved. The largest reductions were found in business travel (26%), buildings (12.5%), and paper (12%).[149]

Determining boundary of a GHG accounting methodology is a value latent step; BC allocates their emissions into four primary areas, buildings, fleet, paper, and business travel (scopes 1, 2, and 3 for business travel and paper).[150] These areas determine what counts within traditional services according to a method that seeks to be equitable across different provincial entities.

---

[143] "Carbon Neutral GOVERNMENT Year in Review 2016." Ministry of Environment and Climate Change Strategy, 2016. https://www2.gov.bc.ca/assets/gov/environment/climate-change/cng/yir/2016-cng.pdf.

[144] "BECOMING CARBON NEUTRAL – B.C.'S PROVINCIAL PUBLIC SECTOR – 2017 REPORTING YEAR." Victoria, British Columbia: Ministry of Environment and Climate Change Strategy, January 2018. https://www2.gov.bc.ca/assets/gov/environment/climate-change/cng/guidance-documents/becoming_carbon_neutral_2017.pdf.

[145] "Carbon Neutral GOVERNMENT Year in Review 2016." Ministry of Environment and Climate Change Strategy, 2016. https://www2.gov.bc.ca/assets/gov/environment/climate-change/cng/yir/2016-cng.pdf.

[146] "BC Climate Action Charter | BC Climate Action Toolkit." Accessed March 6, 2018. http://www.toolkit.bc.ca/BC-Climate-Action-Charter.

[147] "CivicInfo BC | Practice & Innovation: The First Carbon-Neutral Local Government in B.C. - 100 Mile House(City)." Accessed March 6, 2018. https://www.civicinfo.bc.ca/practices-innovations?id=438&stext=carbon+neutral&type=ss&categoryid=+&provider=43&award=+&year=+.

[148] "BC Climate Action Charter | BC Climate Action Toolkit." Accessed March 6, 2018. http://www.toolkit.bc.ca/BC-Climate-Action-Charter.

[149] "Carbon Neutral GOVERNMENT Year in Review 2016." Ministry of Environment and Climate Change Strategy, 2016. https://www2.gov.bc.ca/assets/gov/environment/climate-change/cng/yir/2016-cng.pdf.

[150] Ibid.

The inclusion of strategic scope 3 emissions was intended to engage staff in emission reduction goals through tangible emissions they could readily understand and reduce.

Offsets are a critical portion of the BC strategy. Offsets must be purchased within BC borders and enable further emission reduction efforts.[151] In 2013 the Auditor General of British Columbia audited the operational carbon neutrality of BC governments and concluded that the BC government was in fact not carbon neutral. The audit examined two projects that accounted for 70% of offsets governmentally purchased offsets and found neither to be additional.[152] The two major offset projects were with private organizations that would have completed the project without the investment of the government offset dollars according to their records.[153]

The carbon offset system was also found to unfairly burdensome public-sector organizations, specifically schools due to the concurrent "revenue neutral" carbon tax due to the structure of tax breaks included. The carbon neutrality efforts caused public outcry, as offset money provided by schools was then used to purchase offsets for projects involving private companies. [154]As a result, some said that the system as designed, due to the high offsetting burden actually stifled the potential to invest in carbon reduction strategies. [155] The auditor report along with public pressure ultimately resulted in the termination of the Pacific Carbon Trust, the original offset program.[156]

In 2012-2013 the Carbon Neutral Capital Program was initiated to help fund school energy efficiency projects and replace the previous offsetting program. The following year it was expanded to include post-secondary programs. Since its inception, the fund has dispersed $53.5 million to help fund energy efficiency programs.[157]

Microsoft

Microsoft's president announced in 2017 that the company is adjusting its climate mitigation strategy to comprise more direct reductions of carbon emissions, rather than primarily

[151] "Helping Local Governments Understand How to Be Carbon Neutral in Their Corporate Operations." The Workbook. Union of British Columbia Municipalities, March 9, 2012. http://www.toolkit.bc.ca/sites/default/files/CarbonNeutralWorkbook.V2_noapdcs_03.12_0.pdf.
[152] Doyle, Joyce. "AN AUDIT OF CARBON NEUTRAL GOVERNMENT." Audit. Office of the Auditor General of British Columbia, March 2013. https://www.bcauditor.com/sites/default/files/publications/2013/report_14/report/OAG%20Carbon%20Neutral.pdf.
[153] Ibid.
[154] Barrett, Tom. "Why the Pacific Carbon Trust Draws Political Heat." The Tyee, December 5, 2011. http://thetyee.ca/News/2011/12/05/CarbonTrustDrawsHeat/.
[155] Ibid.
[156] Kazi Stastna · CBC News · Posted:, 2015 3:30 PM ET | Last Updated: April 15, and 2015. "How Canada's Provinces Are Tackling Greenhouse Gas Emissions | CBC News." CBC, April 14, 2015. http://www.cbc.ca/news/canada/how-canada-s-provinces-are-tackling-greenhouse-gas-emissions-1.3030535.
[157] "Helping Local Governments Understand How to Be Carbon Neutral in Their Corporate Operations." The Workbook. Union of British Columbia Municipalities, March 9, 2012. http://www.toolkit.bc.ca/sites/default/files/CarbonNeutralWorkbook.V2_noapdcs_03.12_0.pdf.

purchasing offsets.[158] It has pledged to reduce its carbon emissions 75% by 2030 from its 2013 baseline. To help achieve this goal, Microsoft has integrated a carbon fee into its operations which sends a price signal to employees to help them internalize the cost of carbon across day to day operations and decision making. This allows the company to instill accountability measures and reinvest in renewable energy. The carbon fee helps raise awareness and drive accountability across stakeholders, increase efficiency, and support innovation for carbon reduction through grants. The company is working across four focus areas to reach its carbon reduction goals:

1. Renewable Energy – Increasing the Supply of Renewable Energy
1. Carbon Offset Community Projects – Supporting Sustainable Development
2. Climate Grants – Catalyzing and Accelerating Innovation
3. Track-and-Report – Ensuring Transparency and Accountability

Microsoft has to date focused on three aspirations: 1) "to be lean" which constitutes reducing energy consumption, 2) "to be green" which entails making environmentally responsible choices, and 3) "to be accountable" which means quantifying emissions and carbon impact. These aspirations are grounded in their carbon fee that quantifies the emissions for travel and energy consumption across its operations. Since 2012 this fee has led to more than 9 million $mtCO_2e$ in carbon reductions, purchase of more than 14 million MWh of renewable energy, and fostered a culture of sustainability within the company. Microsoft credits two aspects of the carbon fee to its success so far:

- The price signal it sends to operational departments
- The earmarking of funds for "environmental initiatives"

The carbon fee makes emissions a "line item" in operating budgets and enables it to be accounted for consistently. The fee was designed with a simple model so that Microsoft can provide a template to other private and public entities to use when pursuing their carbon reduction goals. Microsoft remains committed to sharing what they learn from carbon reduction processes with other entities to help grow environmental initiatives throughout the region. The criteria Microsoft used, per their 2015 "Making an impact with Microsoft's carbon fee" white paper, to evaluate viable carbon reduction projects are as follows. Project has:[159]

- Demonstrated carbon reduction

---

[158] "Microsoft Pledges to Cut Carbon Emissions by 75 % by 2030." *Microsoft on the Issues* (blog), November 14, 2017. https://blogs.microsoft.com/on-the-issues/2017/11/14/microsoft-pledges-cut-carbon-emissions-75-%-2030/.
[159] DiCaprio, Tamara. "Making an Impact with Microsoft's Carbon Fee: Inspiring a Virtuous Cycle of Environmental Investment and Action." Microsoft, March 2015.

- Would not occur without the carbon fee investment (additional)
- Demonstrated accountability for return on investment (ROI)
- High-quality estimates of cost and carbon reduction
- Savings vetted by the finance department
- Committed to case study write-up
- Acceptable lease and terms and conditions (landlord approval)
- Includes utility rebates where possible

In the near-term Microsoft is focused on building on short term investments in green power and will make investments in[160] biomass, geothermal, hydropower, landfill gas, and wind. When purchasing these green power sources, the company looks at scope two emissions as outlined in the GHG Protocol.[161]

Google

Google originally achieved a carbon neutral status in 2007 and became 100% renewable in 2017. To reach this and continue improving its energy efficiency, the corporation pursues a 3-fold strategy for carbon neutrality:

- Pursue aggressive energy efficiency initiatives
- Purchase significant amounts of renewable energy, reached 100% renewable energy in 2017
- Buy carbon offsets for any remaining emissions

The company's investments in renewable resources was up to $3.5 billion in infrastructure globally. Roughly $2.3 billion of this is in US-based companies. With these large investments in solar and wind projects, Google emphasizes high-quality, long-term investments in renewables and strives to be a leader in redefining how energy is used across large corporate and government entities. The company was transparent in its use of offsets as an interim solution to achieving carbon neutrality before meeting its new goal of 100% renewable energy in 2017. Google has relied extensively on carbon offsets to claim carbon neutrality since 2012 and has weighed the quality of these offsets against these criteria: additionality, leakage prevention, permanence, and verifiability.[162] It tends to rely on landfill gas capture, agricultural methane

---

[160] DiCaprio, Tamara. "Making an Impact with Microsoft's Carbon Fee: Inspiring a Virtuous Cycle of Environmental Investment and Action." Microsoft, March 2015.
[161] Standard, Corporate. "GHG Protocol Scope 2 Guidance," 2014.
[162] "10 Years of Carbon Neutrality," September 2017. https://static.googleusercontent.com/media/environment.google/en//pdf/10-years-carbon-neutrality.pdf

capture, and forestry projects. Google like Microsoft, takes into account procurement and due diligence associated with these offset projects.

In October 2016, Google committed to zero waste to landfills as they seek to change the traditional standard of a linear "take-make-waste economy". As of 2017, six of its fourteen operating data centers have achieved 100% landfill diversion and its campuses work to responsibly source foods and beverages, reduce its waste across operations, source "healthy" and non-chemical building materials, and control heat and lighting systems to be responsive to building occupancy patterns. These activities save power across its operations and help the company reach its sustainability goals.